RAILROAD GAZETTE

FRIDAY, JANUARY 17, 1902.

CONTENTS

ILLUSTRATED:
The Electric Equipment of the Manhattan Elevated. 34
A New Scherzer Rolling Lift Bridge at Cleveland... 36
The President of the American Society of Civil Engineers 38
36-Foot Box Car with Steel Center Sills—Chicago, Milwaukee & St. Paul..... 40
Prairie Type Passenger Locomotive with Traction Increaser—Atchison, Topeka & Santa Fe..... 41
CONTRIBUTIONS:
Concerning Some Dangers from Electric Traction... 33
The Power of Locomotives..... 38
EDITORIAL:
The High-Speed Brake in Relation to an Accident... 42
A Danger in Electric Traction..... 42
The Collision in Fourth Avenue Tunnel..... 42
Editorial Notes 44
New Publications 44
Trade Catalogues 44
MISCELLANEOUS:
Interstate Commerce Commission Hearing at Chicago. 33
Train Tonnage 37
The New Railroad Terminals at Washington..... 37
American Society of Civil Engineers..... 38
Equations Expressing the Power of Locomotives.... 38
The Sanitary Condition of Nicaragua and Panama... 38
The Fourth Avenue Tunnel Collision..... 39
Another Ship to Burn Liquid Fuel..... 39
Massachusetts Commissioners' Decision as to Competing Express Companies..... 39
Ohio Railroad Commissioners' Report..... 45
The Responsibilities of the Educated Engineer..... 45
GENERAL NEWS:
Technical 45
The Scrap Heap..... 46
Locomotive Building 47
Car Building 47
Bridge Building 47
Meetings and Announcements..... 48
Personal 49
Elections and Appointments..... 49
Railroad Construction 49
General Railroad News..... 50

Contributions

Concerning Some Dangers from Electric Traction.*

January 11, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

It may prove useful at this moment to direct the attention of the press to certain features incident to the use of electricity for the operation of trains or cars.

From the comments which have already been made in regard to the accident which is now uppermost in our minds, it seems to be assumed that such accident would in all probability not have occurred if the colliding trains had been propelled by electricity, and also that the absence of steam would have lessened the risk to the occupants of the telescoped cars. As a matter of fact, with an electrically operated train the risk of accident will, judging by experience, be increased rather than diminished because of the presence of the heavy electrical machinery which it is proposed to attach to several cars of each train. Already there have been many serious collisions with great loss of life between electric cars, while there have been numerous cases in New York and other places in which cars have been quickly destroyed by fires which have resulted from some derangement of the electrical apparatus or circuits and in some instances so quickly that passengers have had scarcely time to escape to the street.

It should be borne in mind that the electric energy required to operate a heavy train is sufficient to melt a considerable bar of iron; or to start a dangerous fire, if anything goes wrong, upon a car of ordinary combustible construction, much more readily than the car stove, the use of which has been abolished by law. Therefore, if a collision were to occur between two electrically fitted trains each having several combustible cars thereof fitted with electrical apparatus and carrying electrical circuits throughout, there could be an accident of so serious a character as to start an agitation having for its purpose the abolition of the use of electricity altogether, or at least to compel the railway companies to abandon the use of combustible cars fitted with electric motors.

The destruction by fire of a car or train upon a street or upon a level is one thing, but such an occurrence upon an elevated railway or in a tunnel can have consequences the contemplation of which should lead to wise regulations governing the construction and use of electrically propelled trains and thereby insure to the public the rapid development of electric traction.

In Liverpool, during the past month, an electric train, while running in a short tunnel was set on fire by the electric current and totally destroyed with considerable loss of life.

GEORGE WESTINGHOUSE.

*Printed also in the *New York Times*.

The Power of Locomotives.

South Easton, Jan. 11, 1902.

TO THE EDITOR OF THE RAILROAD GAZETTE.

I was much interested in reading the abstracts from Prof. Goss' paper, The Power of Locomotives as Affected by Locomotive Valve Gears. The maximum power, as affected by the boiler capacity, seems to be the line for improvement from which good results can confidently be expected. I thoroughly agree with Prof. Goss, that the average valve motion offers very little field for improvement, as regards steam distribution and power of engine. If one-half the time that has been spent on valve motions in an effort to get a theoretical indicator card had been spent in studying steam generation, more tangible results would have been obtained. From experience, I do not think it an exaggeration to say, that of two engines the one with a poor valve motion and steam distribution, but efficient boiler, and the other with the best of known arrangements for steam distribution, but an indifferent boiler, the one with the better boiler will be a successful engine, as regards the transportation department, and fuel economy, while the other will be a failure in proportion to the inefficiency of the boiler.

The variations between the best and the worst types of valve motions, as affecting the power and economy of an engine, are so small compared to the efficiency of the boiler, as to render obvious the advisability of using available time and effort for the improvement of the generator rather than the motor. This is not to be construed as meaning that we have reached perfection mechanically, as either the piston or present slide valve are a good ways from that desirable condition.

While the steam consumption of the locomotive compares favorably with the stationary engine under the same conditions, how about the steam generation? The discrepancy in this item is such, that it should incite further effort to lessen it. German engineers are using superheated steam on locomotives, with very decided economy. That they have some trouble with leaking joints, is only a mechanical difficulty and should be overcome. (See A. S. M. E., Vol. XXII, pages 899-954, and 842-887). It is only recently that grate surfaces have been of sufficient area to allow of a reasonable consumption of coal per square foot of grate per hour. In this respect our best practice is only equivalent to the worst of French practice.

For increasing the power and economy of the locomotive, it seems evident that improvements in steam generation are not only possible, but some improvements that are almost unknown in American usage, are at least being investigated in Europe.

F. F. GAINES.

Interstate Commerce Commission Hearing at Chicago.

The Interstate Commerce Commission, at its session in Chicago, Tuesday, Jan. 7, heard the testimony of D. T. McCabe (Pennsylvania Lines West of Pittsburgh), E. F. Cost (Cleveland, Cincinnati, Chicago & St. Louis), B. B. Mitchell (Michigan Central), G. J. Grammer (L. S. & M. S.), J. M. Johnson (Chicago, Rock Island & Pacific), Thomas Miller (Chicago, Burlington & Quincy), F. A. Wann (Chicago & Alton), A. C. Bird (Chicago, Milwaukee & St. Paul), and Paul Morton (Atchison, Topeka & Santa Fe).

All of the witnesses admitted having carried freight at secret rates lower than the tariff; and, at great length, gave particulars confirming substantially all that has been published in the shape of rumors and unconfirmed statements about illegal rate cutting. The most of the irregularities spoken of in the testimony were in connection with dressed beef and packing house products for export. It appears that when a reduction was made the same rate was made to practically all of the shippers of that kind of freight for the time being. All of the railroad officers, when asked to suggest a remedy for the demoralized state of affairs which they described, said that the legalization of pooling was the most effective remedy that they could think of. The commissioners inquired if this would not tend to increase tariff rates, but the replies were unanimous that it would not; except that on some commodities, such as dressed beef, where the rate is now absurdly low, there might be some advance.

From the report in the Chicago *Inter Ocean* we quote some of the testimony.

Mr. McCabe, having testified to secret reductions on his road of 3 to 5 cents per 100 lbs., and having replied, to a request for a statement of shipments showing rebates, that he doubted his ability to produce the records, was asked by Commissioner Clements why he could not; and he said:

"I don't believe we have kept such records."

"No records of transactions involving so much money?" doubtfully asked the commissioner.

"I do not think we kept them after they had served their purpose."

"Why not?" insisted the commissioner.

"Possibly because we thought you might ask to have them laid before you," admitted Mr. McCabe.

"You mean to say, then, sir, that those records were destroyed for the purpose of removing evidence of your illegal acts?"

"Yes; that was the purpose, if they were destroyed. I do not say they have been destroyed, but I think they have been."

"Who is responsible for such serious violations of the law—such reductions from your public tariffs?"

"I am in charge of traffic matters and do what I feel is necessary to protect the interests of the company."

"Does the President of the Pennsylvania company sanction such actions by you?"

"He leaves traffic matters to my discretion."

"Doesn't he know when you are cutting rates?"

"He knows nothing of the details. From time to time I may inform him that the rate situation is unsatisfactory."

"Do the Pennsylvania Lines East of Pittsburgh join yours in paying rebates on through shipments?"

"Yes."

"Have you shown any discrimination to certain shippers in cutting rates?" asked Chairman Knapp.

"No. The same rate was given to all shippers of dressed beef and packing house products. All our patrons understood they were getting equal rates."

Mr. Mitchell, speaking on the same subject, said:

"I don't believe we have the records on which rebates are paid."

"What became of them?"

"They were destroyed."

"Haven't you books which will tell?"

"We don't use books to record such transactions."

"Why not?"

"It is not thought to be a wise plan to pursue."

"Did you destroy those papers to destroy the evidence of the transactions?"

"It is customary to destroy them."

"Is it customary to destroy other valuable papers of as recent date as those regarding rebates?"

"It is not the rule."

Mr. Morton, speaking of dressed beef and packing house products from Kansas City, said:

"We have carried such traffic from Kansas City to Chicago since last April for 5 cents less per 100 lbs. than the published rate. Prior to last April we carried less than 2 per cent. of that traffic from Kansas City, while we carry to Kansas City 30 per cent. of the live stock. We were taking in more live stock than any other line, and taking out less dressed beef and packing house products than any of our competitors. We did not know then whether rates were being cut via St. Louis or not, although it afterward developed that they had been. We were confronted by a condition, not a theory. We went to one of the largest packing firms and offered to carry their business for a period of one year at 5 cents less per 100 lbs. than the tariff rate from Kansas City to Chicago. That contract runs until July 1 next. That contract is illegal. We knew it when we made it. We were disposed to make it an open rate, to publish a tariff, but refrained from doing so at the request of the other railroads. They all knew of it; we told them about it. All the packers knew of it, and the rate was given to any of them when they wanted it. All shipments were billed at tariff, and we paid the difference in cash to the shippers."

"To whom did you pay rebates in cash?"

"The principal shippers were Schwarzschild & Sulzberger, but cash settlements were made with other packers, through their agents in charge of that branch of their business—agents of Swift, Morris, Armour and others."

"How much did you pay in rebates to packers last year?"

"Over $50,000."

"Who ordered those rebates paid?"

"I did."

"What does rate cutting on all classes of traffic cost the Santa Fe system per annum?"

"That is hard to answer—from $500,000 to $1,000,000."

The railroad officers, telling of their dealings with the large shippers, gave the names of the individuals with whom they dealt; and it is said that the Commission contemplates prosecuting these men, but there is no authoritative confirmation of this statement.

On Wednesday the Commission had intended to investigate the recent consolidations of the northwestern railroads, but the presidents and other officers whom they expected to question did not appear. It is said that some of these railroad officers sent adequate excuses for not appearing, and that others did not.

At Kansas City, on Thursday, the Commission listened to testimony from a number of grain shippers, some of them having charged that, on account of private rates given by certain railroads to favored shippers, they were unable to compete successfully with them.

W. P. Trickett, Chairman of the Transportation Bureau, testified that Kansas City grain men could not compete with certain firms whose headquarters were in St. Louis of Chicago; in fact, even with certain dealers in little towns like Leavenworth and Atchison, because some railroads gave special rates to them. He said that each road was reputed to have one favored shipper. He mentioned Counselman & Co., of Chicago, as being the favored one of the Rock Island; Richardson & Co., of Chicago, as getting special rates from the Santa Fe, and Hall & Robinson, of St. Louis, as having a secret arrangement with the Missouri Pacific. The grain business around Atchison, Kan., was controlled by Greenleaf & Baker, with the assistance of a cut rate from the Missouri Pacific, and around Leavenworth, by Denton Bros., through the same railroad.

Mr. Robinson, of the grain firm of Hall & Robinson, an unwilling witness, admitted that his firm had a secret arrangement made with W. P. Smith, Freight Traffic Manager of the Missouri Pacific, by which it was able to control the bulk of the export trade. The rebate, he said, amounted to from 3 to 5 cents. He did not give the exact figures and said there were no books or vouchers in possession of his firm which would show its exact nature.

The Asiatic Midland Railroad (trans-Caspian) seems to have developed a respectable traffic for a line which lies in great part in a particularly barren desert. In 1898 it earned gross $4,041 and net $1,031 per mile, the working expenses being 72 per cent. of the earnings. The Siberian Railroad in that year made a very poor showing. It reports as two roads, the West Siberian, earning $3,174 gross at a cost of $3,958 for expenses; while the Central Siberian earned $3,437 gross at an expense of $3,527 per mile. It will be remembered that these lines in 1898 had been very recently opened, and that they were carrying passengers, as they still do, for much less than cost.

The Electric Equipment of the Manhattan Elevated.

On Thursday of last week the Manhattan Railway Company, of New York, took a party of guests over the Second Avenue line in a special electric train. After the run to the north end of the line the party was taken to see the power house. There were present on the occasion, engineers, capitalists, and railroad officers representing very important professional and business interests.

The train, as made up, was six cars, the first, third, fourth and sixth being motor cars, the second and fifth being trailers. This will be the normal train for the hours of heavy traffic. The cars were good specimens of the art, having been built at the Jackson & Sharp Works of the American Car & Foundry Company. The power plant is most impressive, in fact, it is as magnificent and stupendous an example of power plant engineering as one could see. It is still far from complete, and we should guess from the looks of the plant that it will still be a number of months before many trains will be run in regular service; although it is intended that a few trains shall work regularly from now on. A very short description of the train arrangements follows, and a more complete description of the power plant.

CAR EQUIPMENT.

Six-car trains will be run during rush hours, increasing the carrying capacity 20 per cent. Each six-car train will consist of four motor cars and two trailers, each of the four motor cars being equipped with two motors of General Electric manufacture, which will easily develop, when starting the train, 300 h.p., the total weight of motors for each train being about 35,000 lbs., and the total horse power per train 1,200. Each old locomotive weighs about 46,000 lbs., and develops about 300 h.p. One thousand eight hundred of the new motors have been ordered, aggregating 270,000 h.p. These motors take the place of about 300 locomotives and will operate more trains and heavier trains at higher average speed, permitting each train and train crew to make more round trips during a working day.

The eight motors on one six-car train weighing with passengers 154 tons will, on a level track, bring the train up to a speed of at least 15 miles an hour 10 seconds after starting from the station, which is over twice the speed that the steam locomotives can reach in the same number of seconds with a five-car train. If allowed to run up to full speed the electric trains will reach 40 to 45 miles an hour on a level track.

The motorman controls all eight motors on the four motor cars of a complete six-car train with one controller, much smaller than the controller of the ordinary street car. Each of the motor cars is fitted with the General Electric Company's train control. Each motor car is fitted with a master controller at each end, so that a train of any number of cars may be reversed at the end of the route without switching.

Each of the motor cars on the elevated line is also equipped with an electrically-driven air compressor for working the air-brake system. Each compressor consists of a motor, about 5 h.p., direct connected to a two-cylinder direct-acting air pump without gears. Each compressor is controlled by an automatic governor which maintains the proper air pressure in the storage tank. The Westinghouse quick-action automatic brake is used, giving much quicker retardation than the vacuum brake, thus allowing speed to be held longer.

The complete motor and controller equipments, as well as the air compressors and their governors, were designed and built at Schenectady by the General Electric Company, this being the largest single order ever placed for electrical apparatus.

POWER PLANT.

The generating station occupies the block bounded by Seventy-fourth, Seventy-fifth, the exterior streets, and the East River. All current is generated there, the plant having a maximum capacity of 80,000 h.p. The main building is divided by a longitudinal wall into two parts: the boiler plant and accessories occupying one-half and the engines and dynamos the other. The dimensions of the building are 204 ft. 4 in. wide, 395 ft. deep on Seventy-fourth street, and 413 ft. on Seventy-fifth street. The location of the plant on the river front affords an easy and economical means for handling coal and ashes.

The unit plan was adopted for the general design of the power plant, the equipment being arranged in eight complete and practically independent units, each consisting of one engine and alternator, four batteries of boilers, one condenser and one boiler-feed pump, all connected by the necessary piping. The boiler equipment comprises 64 Babcock & Wilcox horizontal water-tube boilers of 525 h.p. each, arranged in batteries of two each, and capable of sustaining safely 200 lbs. working steam pressure.

Roney mechanical stokers are being installed in this plant by Westinghouse, Church, Kerr & Company. It was estimated by the engineers for the Manhattan Company that at least 270 men would be required to fire these boilers by hand, whereas with the stokers this force can be reduced to 90 men, a saving in labor alone of $400 per day. Another important advantage gained by the adoption of this stoker is that it will permit the use of hard or soft coal, either separately or mixed. The present installation will consist of 256 stokers under the 64 525 h.p. boilers, and they will be capable of developing 50 per cent. above the rated capacity of the boilers. The total equipment when the plant is completed as designed will consist of 384 stokers attached to 96 525 h.p. boilers; a total of 50,400 h.p., making this the largest boiler plant ever designed or installed. Sixteen Green fuel economizers are employed, one for every two batteries of boilers. They are of the high-pressure type and aggregate 8,192 tubes. Huge stacks will furnish enough draft for ordinary requirements, but as a precautionary measure 16 blowers were installed by the B. F. Sturtevant Company to furnish forced draft when needed. These blowers will be operated by Westinghouse alternating current induction motors. Eight triplex, single acting, boiler feed pumps of the Gould type are driven by 500-volt direct-current motors.

Engines and Dynamos.

There will be eight Westinghouse 5,000-k.w. alternators, direct-connected to Allis-Corliss engines at both ends of the shaft, as shown in Fig. 1. One of these sets is finished and in working order. The second set is nearly ready to work and the others are in various stages of completion. While the nominal rating is 5,000 k.w., they have each a maximum capacity of 10,000 h.p. and are the largest electrical generators that have ever been made.

The steam engines were built at the Allis shops in Milwaukee, after designs of Mr. Edwin Reynolds, and each consists of a pair of compound engines working upon the same shaft, the high pressure cylinders being horizontal and the low pressures vertical, the high and low of each end taking hold of the same crank pin. The dimensions are:

Diameter high-pressure cylinders	44 in.
Diameter low-pressure cylinders	88 in.
Volumetric ratio	4
Stroke common to all	5 ft.
Revolutions per minute	75
Piston speed per minute	750 ft.
Diameter piston rods	8 in.
Displacement low-press. cylinders, both, per min.	63,094 cu. ft.
H. P. per lb. m. e. p. referred to low-press. cylinders	275.92

The capacity of the engine is from 7,500 h.p. to 12,000 h.p. maximum. To get this capacity into a two-cylinder engine of the ordinary cross-compound type would require cylinders 62 and 124 in. in diam. By the use of four cylinders each crank is given four instead of two impulses at each revolution. If the cranks were set square or in line with each other at 90 deg. or 180 deg., the impulses upon the two pins would coincide, but by setting one crank at 135 deg. the shaft receives eight impulses per revolution, which makes the turning effort upon the shaft so uniform that the revolving field of the generator takes the place of the fly-wheel. This arrangement prevents any dead center, and it enables the operator to start off a unit of this size from any point without any attention to the position taken by the cranks in stopping. The advantage of a vertical position is retained for the large low-pressure cylinder; the only complication introduced being the attaching of two connecting rods to a single overhanging crank pin.

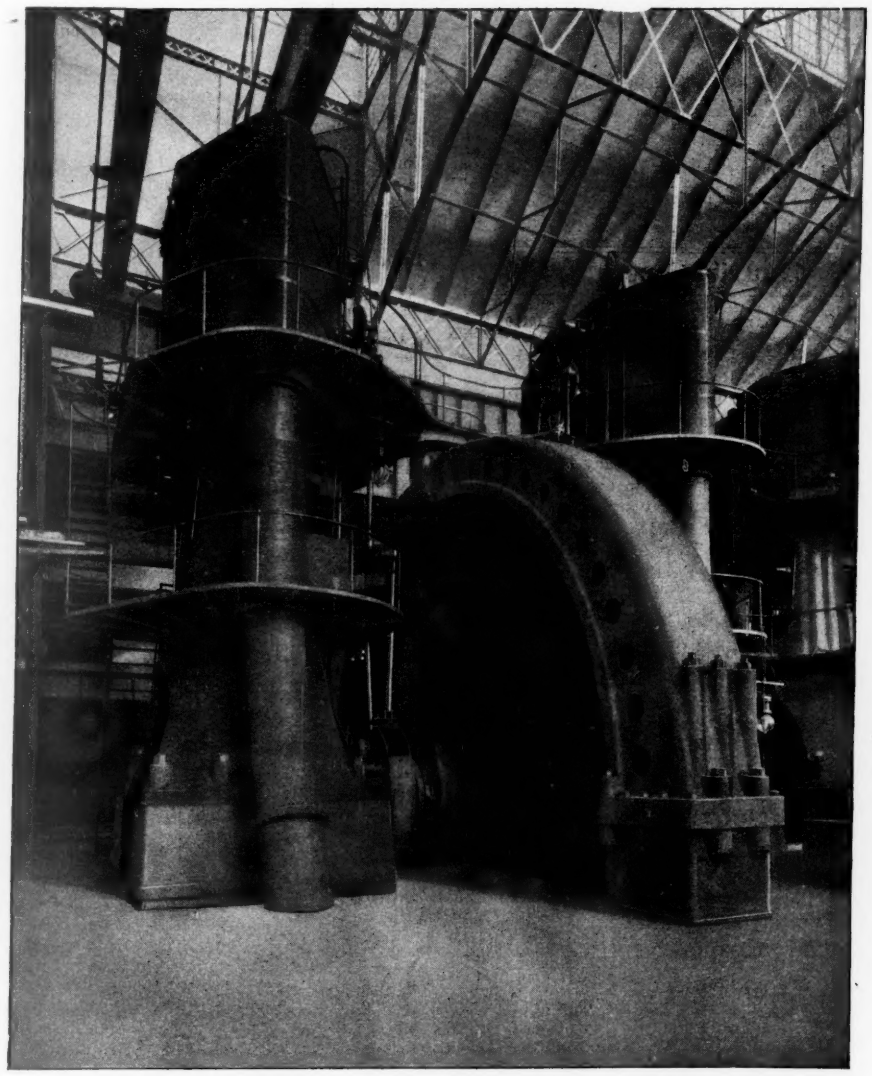


Fig. 1.—5,000 k. w. Westinghouse Alternator in Manhattan Elevated Railway Power Plant.

Steam jackets are not used, but the placing of the valves in the heads of the low-pressure cylinders leads to a partial jacketing effect in those heads. The ordinary Reynolds-Corliss valve gear is employed, with a single eccentric on each high-pressure cylinder and separate eccentrics for the steam and exhaust valves of each low-pressure cylinder. The two sides of the engine are entirely distinct, and one can be run with the other uncoupled without affecting its steam efficiency.

Steam is conveyed to the high-pressure cylinders at 150 lbs. gage pressure, by 14-in. mains. From the high-pressure cylinder the steam passes through a 16-in. pipe to a vertical receiver, which is virtually a downward prolongation of the steam chest or side pipe of the low-pressure cylinder. A separate receiver is provided for each side, containing 773 sq. ft. of reheating surface composed of 2-in. copper pipe, filled with steam at boiler pressure. From the receiver the steam passes to the low-pressure cylinder, which exhausts through 30-in. pipes joined into one 40-in. main, leading to the condenser, one condenser being provided for each complete unit.

The pistons are rectangular in cross section with bull and packing ring and follower, all heavily ribbed, screwed on to the rod with a jam-nut and keeper. The rods are all 8 in. in diam., of open-hearth steel, screwed into the crosshead as well as into the piston. The Allis-Reynolds crossheads have been modified, and provision made for fastening the babbitt-lined shoe to the body of the crosshead in addition to the usual studs of the adjustable wedges. The connecting rods of the vertical and horizontal engines are of the same length, 5.4 cranks. They are of open-hearth forged steel, with a solid end in the crosshead and strapped at the crankpin end. The crosshead pins are 12 x 12 in. and the crank pins 18 x 18 in., or 9 x 18 in. for each rod.

Westinghouse Alternators.

Each of these generators delivers three-phase current at 11,000 volts, which, if necessary, may be raised to 12,000 volts. The wave form generated is practically a true sine curve under all conditions of load and power factor, and the regulation from no load to full load is guaranteed to be within 6 per cent. The rise in temperature above the surrounding air of any part of the machine under full load for 24 hours is not to exceed 35 deg. C., and at 50 per cent. overload, or 7,500 k.w., it is not to exceed 55 deg. C. The efficiency at full load from engine to switchboard is 96.5 per cent.

Mr. L. B. Stillwell, the consulting engineer of the Manhattan Company, calls attention to other distinctive features in the design and construction of the equipment that may be enumerated here with profit:

Uniformity and symmetry in organization and arrangement of apparatus, both in power house and in substations, it is believed, will facilitate future extensions,

and secure advantages of simplicity in construction, and more especially, in operation.

The design of the engine-dynamo unit eliminates the usual auxiliary fly-wheel. The weight and dimensions of the revolving dynamo field are such, with reference to the turning moment of the engine, that any auxiliary fly-wheel is unnecessary.

The revolving parts of the dynamos are particularly designed to secure very unusual strength and consequent ability to resist the tendency to burst and fly apart in case of temporary abnormal speed through accident of any kind. The hub of the revolving field, which is also the fly-wheel of the engines, is of cast-steel, and the rim is carried not by the ordinary spokes but by two webs of rolled steel.

The angular velocity of the revolving field, as determined by the relation of fly-wheel effect and torque or turning moment exerted upon the shaft by engine pistons, is uniform to an extraordinary degree.

Especial effort was made to attain close approximation to the theoretically perfect form of the "potential curve" —"wave phase"—through a half cycle, that is, the sine curve, the armature being so wound as to provide four conductors per phase per pole.

The field is the rotating member of the big alternators. It was designed with especial regard to mechanical strength, the field magnets with their windings forming the rim of a huge wheel, which is attached by two web plates of rolled steel to a cast-steel hub keyed directly to the engine shaft. This revolving field is 32 ft. in diam., and in operation turns at 75 r.p.m., making its peripheral speed 7,546 ft., or more than a mile per minute. Its weight is 370,000 lbs.

To produce a wave form free from irregularities and of the same shape at different loads, a distributed winding with four armature slots per phase per pole was adopted. This tends to avoid the production of harmonics, which is an especially important matter in view of the large capacity and self-induction of an extensive system of cables and transmitting apparatus, especially where a large number of 1,500 k.w. rotary converters are to be employed. Each slot contains three bars, which are securely fastened to the end connectors. The bars in any slot may be removed without disturbing the bars in the other slots and without moving the frame of the machine. The armature conductors are insulated to withstand a puncture test of 25,000 volts alternating current for 30 minutes. The Westinghouse Company was well equipped for building big alternators, but special cars were built to haul these alternators to New York. The weight of a completed machine is 900,000 lbs., its height 42 ft.

The most important feature of the auxiliary plant at the power house is the exciter equipment. Current for exciting the fields of the alternators will be supplied by a battery of four 250 k.w. exciters, also furnished by the Westinghouse Electric & Manufacturing Company. These exciters are of the engine type, the armature and commutator of each machine being bolted together upon a ventilated cast-iron sleeve and pressed upon the engine shaft. It is proposed also to install rotary converters and transformers at the central power station for furnishing current for operating motors, and the lighting plant. Altogether the lights and motor service from the plant, irrespective of the car equipments, will require as much current as many central stations in fair sized cities.

High-Tension Side. *Low-Tension Side.*

Fig. 2.—Transformer for Sub-Station.

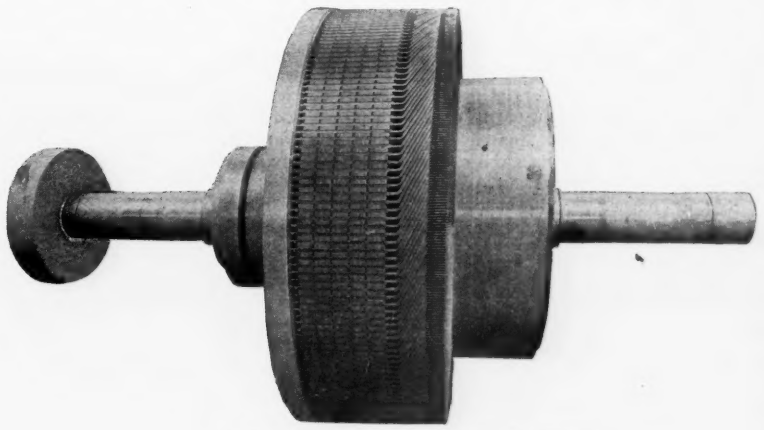


Fig. 5.—Armature of Rotary Converter.

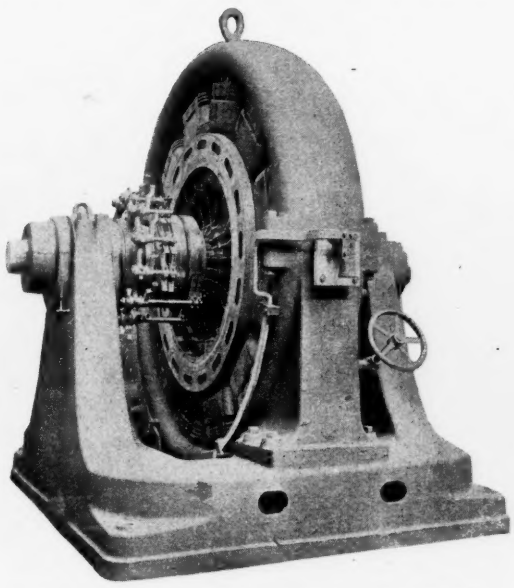


Fig. 3.—Rotary Converter—Alternating-Current Side.

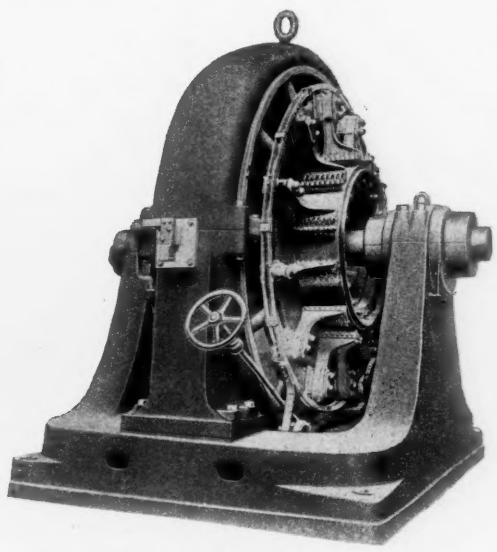


Fig. 4.—Rotary Converter—Direct-Current Side.

Distribution System.

The current is to be distributed over the entire system of the Manhattan Railway, 37 miles of road. The potential at which it leaves the power plant is 11,000 volts, and eight sub-stations have been erected at convenient points along the lines of the road where transforming apparatus is installed to reduce the voltage to proper pressure for use in connection with rotary converters.

The rotary converters are arranged in two parallel rows, and the transformers are located in groups of three upon galleries along the sides. There are 26 rotary converters and 78 transformers in these sub-stations. Each rotary receives current from a group of three 550 k.w. step-down transformers connected in delta, at a potential approximately 390 volts. The sub-stations are located at unequal distances from the power station, and as all of the sub-stations are to be supplied with power from alternators operated in parallel, the effective potentials delivered by the high potential distributing cables to the several sub-stations will differ. In order that the potential of the direct current delivered by the rotary converters shall be equal, provision for the adjustment of the ratio of transformation of the step-down transformers is made by means of loops brought out from the primary windings.

The transformers are of the air-cooled Westinghouse type. Motor-driven blowers are installed in each sub-station for supplying the necessary air. The construction of these transformers is illustrated in Fig. 2, where two views are presented.

The guaranteed efficiency of the transformers at full load is 97.75 per cent. The overload ratings of the transformers are proportioned to those of the rotary converters.

The rotary converters are larger than any that have heretofore been constructed, having a nominal rating of 1,500 kilowatts and a maximum capacity of 2,250 kilowatts, or 3,000 h.p.

The collector to which the alternating currents are delivered from the step-down transformers is the Westinghouse open type, and is shown, together with other features of this side of the machine in Fig. 3. The construction of the direct current side is shown in Fig. 4. The armature is shown in Fig. 5.

The field frame is of cast-iron and the pole pieces are of laminated steel. The faces of the latter are beveled at the edges to permit of the use of copper shields. The series field is designed to assist the shunt as the load comes on the rotary converter, and is sufficient to compound the latter from 575 volts at no load to 625 volts full load. The series winding consists of copper strap wound on edge. The wave form of these converters is practically the same as that of the alternators. The converters are guaranteed to stand an overload of 100 per cent., and may be overloaded to several times the normal full load without falling out of step. In the construction of these converters, the Westinghouse Company aimed to make the fly-wheel effect relatively small, and the effect of the copper shields powerful enough to have the controlling effect upon the armatures of the converters. The

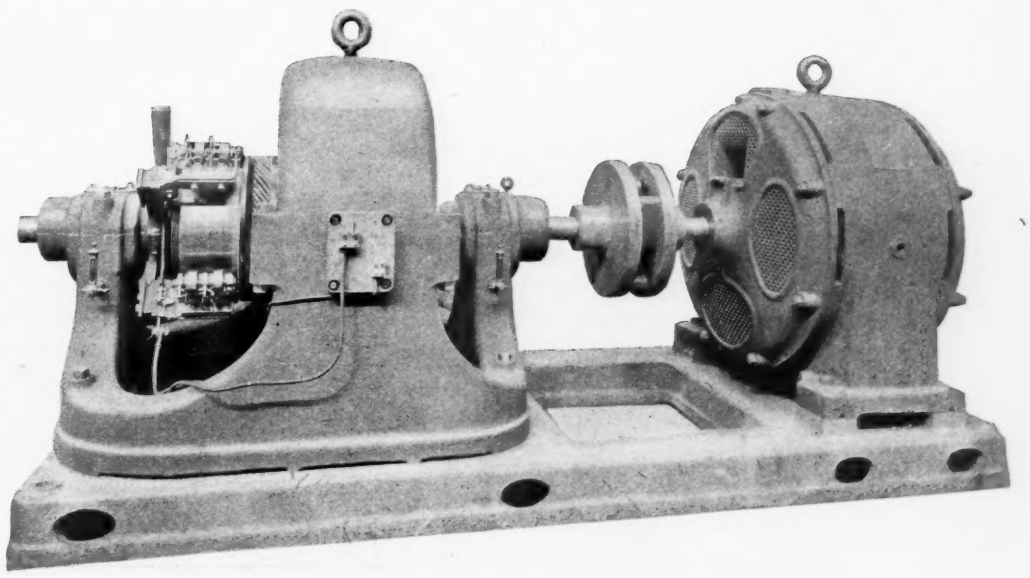


Fig. 6.—Motor-Generator Set for Starting Rotary Converters in Sub-Stations.

total weight of each converter is 105,000 lbs., the height 13½ ft., and the floor space is 13 ft. x 10 ft. The converters are started by direct current. A motor-generator set, Fig. 6, is installed in each sub-station for furnishing the current for that purpose. The method of starting by direct current derived from these starting sets, rather than by direct current taken from the main bus-bars of the sub-station, was determined upon to avoid undue magnetic and electrical strains in the converter, such as may easily result from a slight mistake of the operator, for example, in closing the synchronizing switches when the machines are not exactly in step.

The plans of the Manhattan Elevated Railway Company provide for handling 200,000,000 passengers during the next year, and the new equipment will enable them to put on many more cars and run their trains oftener and at higher speed than could be done with steam locomotives. It is estimated that 150,000 passengers can be carried in an hour when the equipment is complete. This represents the movement of over 200 trains, requiring an expenditure of energy varying from 5,000 h.p. at the hours of minimum load to 60,000 h.p., at the hours of maximum load.

A New Scherzer Rolling Lift Bridge at Cleveland.

At most of the important lake and tidewater ports work is under way for the improvement of internal harbors with a view to increasing their value for the interchange of rail and water traffic, and to provide for larger vessels. While the nature of these improvements varies with the local conditions, an important part of the work is the replacement of center pier swing bridges with bascule bridges. An interesting example of this kind is shown by the new double-track Scherzer rolling lift bridge just completed at Cleveland, Ohio, where the Cleveland, Cincinnati, Chicago & St. Louis crosses the Cuyahoga River.

This river channel is being deepened, widened and made straighter and the slow moving swing bridges, with the obstructions formed by center piers and pile protections, are being replaced by modern bascule bridges. These lift bridges are quicker in action, afford wider clear channels, require the least right of way in their movements, obstruct no part of the navigable channel and in no way interfere with the adjoining dock property as do the swing bridges. In pursuance of this policy the Cleveland, Cincinnati, Chicago & St. Louis has replaced two of its swing bridges at Cleveland with Scherzer rolling lift bridges, and the City of Cleveland is building another bridge of the same kind over the Cuyahoga River at Middle Seneca street.

The Cleveland, Cincinnati, Chicago & St. Louis first built a single-track Scherzer bridge for freight traffic, affording a 110-ft. clear channel for navigation. This bridge proved so satisfactory that the same road has now built a double-track Scherzer bridge at its most important crossing in Cleveland. This bridge, shown by the engravings, carries the through passenger traffic of the Cleveland, Cincinnati, Chicago & St. Louis, the Lake Shore & Michigan Southern and the Erie R. R.; also the freight traffic of the Cleveland, Cincinnati, Chicago & St. Louis. It is undoubtedly one of the busiest and most important movable bridges in the country.

The swing bridge replaced was a comparatively new bridge, having been in service only two years when the navigation interests necessitated its replacement. Fig. 1 is a plan of the site showing the swing bridge which has been replaced. With the old bridge the clear channel was 68 ft. 6 in. and on account of a bend in the river the protection piling had to be driven well inside the usual lines. The inner dotted lines in Fig. 1 show the protection as built and the outer dotted lines the protection which would have been used if the channel had permitted. On account of the bend and the narrow opening, the old bridge had to be partly opened to admit a vessel and then swung around as the vessel passed through the draw. The new bridge gives a clear channel of 100 ft. at right angles to the river.

Fig. 2 is a general plan of the double-track lift bridge as built. It is a single-leaf 120-ft. long, center to center of main bearings. The over-all length of the bridge is 281 ft. This over-all length includes the approach span, a 70-ft. deck plate girder designed by the railroad. The overhead clearance above the base of the rail is 22 ft. 6 in. and the head room under the bridge is 20 ft. at mean water level. The live load used in designing the superstructure of this bridge was two consolidation locomotives having 50,000 lbs. on each pair of drivers, followed by a uniform load of 5,000 lbs. per ft. on each track. The Cleveland, Cincinnati, Chicago & St. Louis general specifications for railroad bridges, edition of 1900, were used. The moving span revolves vertically through an angle of 81 deg. 30 min. for a full opening, though about 90 per cent. of the water craft require only a partial opening for passage through this type of bridge. The bridge is balanced so that the line of travel of the center of gravity of the whole rolling system is horizontal. The operating machinery has, therefore, only the resistance of friction and wind to overcome. The track girders upon which the bridge rolls are supported continuously by the abutment, which is entirely on one shore of the river. The operating strut is a riveted lattice girder connected to the rolling span by a pin located in the axis through the center of curvature of the rolling segment, so that the operating strut travels in a horizontal line. The operating strut is provided with a cast-steel rack having teeth of 7-in. pitch and 21-in. face which engage a pinion of 33½-in. pitch diam., which is a part of the operating machinery. The overhanging portion of the operating strut is supported on simple rollers provided for the purpose.

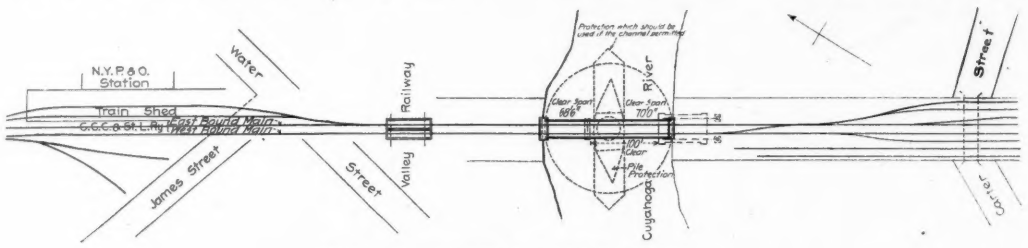


Fig. 1.—Location of New and Old Bridges.

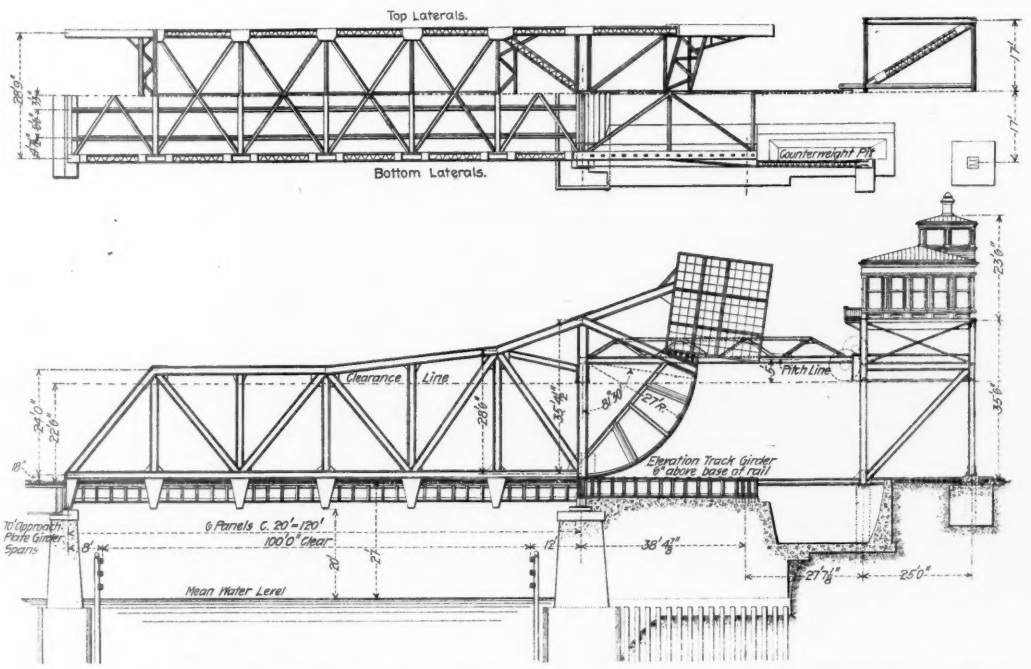


Fig. 2.—General Plan of Double Track Scherzer Rolling Lift Bridge at Cleveland, Ohio—Cleveland, Cincinnati, Chicago & St. Louis Ry.

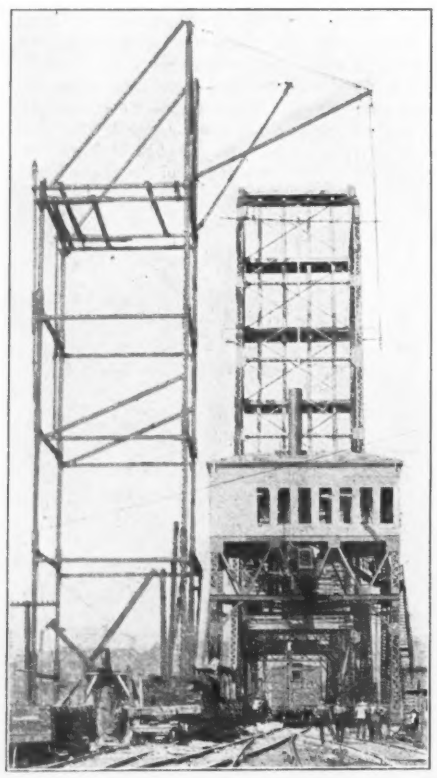


Fig. 3.

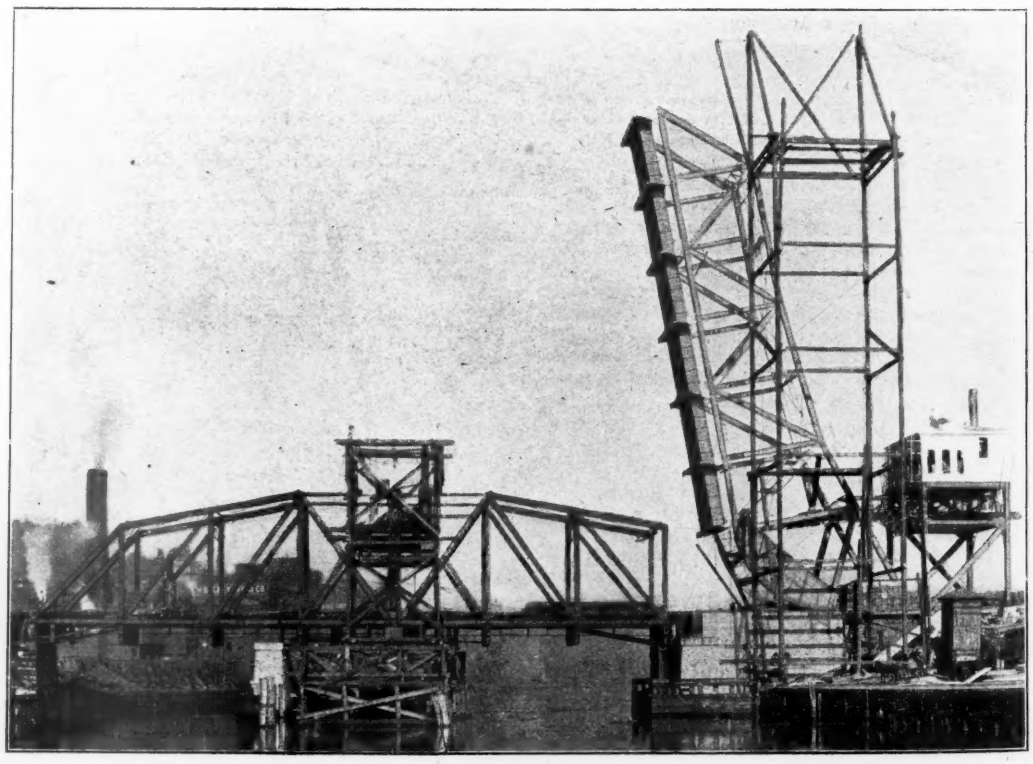


Fig. 4.

The bridge is operated by a double cylinder, reversible link-motion, 75 h.p., Lidgerwood steam engine which will open or close the bridge in about 30 seconds. The operator's house is larger than required for the bridge operator ordinarily, as it also provides room for the levers of the interlocking signal system and bridge signals.

There was no delay whatever to the large railroad and vessel traffic during the erection of this bridge. Figs. 3 and 4 show how the railroad traffic was handled over the swing bridge while the lift bridge was under construction. The false work was put up at one side and the new bridge was erected in the open position and on the alignment of the old swing bridge. While this work was in progress one panel of the swing bridge was removed and that end weighted with rails piled on the bridge. In this way the swing bridge was continued in service. When the lift bridge was completed the old bridge was swung open, the center was removed and then the lift span was lowered in place. While this was going on the girder approach span was run out, Fig. 5 showing this work in progress. Fig. 6 shows the new bridge ready for railroad traffic, the lift span when closed dropping into the space formerly occupied by the center of the swing bridge. The new bridge was put in operation without any delay to trains, and it has been in constant service ever since.

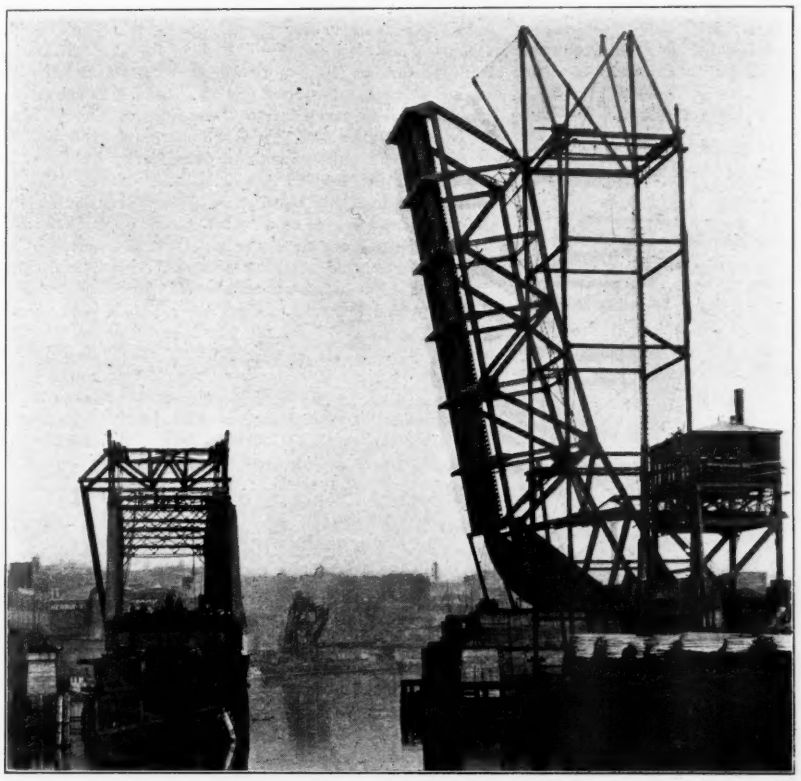


Fig. 5.

The entire work was done under the direction of Mr. George W. Kittredge, Chief Engineer of the Cleveland, Cincinnati, Chicago & St. Louis, who also prepared the detail plans for the substructure and the 70-ft. plate girder approach. The superstructure was designed by and under the patents of the Scherzer Rolling Lift Bridge Company, Chicago, which company also furnished a consulting supervision over the construction. The King Bridge Company, of Cleveland, Ohio, was the contractor for the superstructure, including the machinery and erection. Mr. I. D. Tuttle, of Cleveland, Ohio, was the contractor for the substructure.

Fig. 6.

Italians are the chief laborers on railroad earthwork and similar work in France, Germany, Austria and Switzerland, as well as here; but now that work is hard to get by the natives, protests are heard against the Italian cheap labor. These have been made especially in Austria, where three long tunnels on a new railroad to the Adriatic have been begun. The authorities answer that natives are employed so far as possible; but that it is difficult to find them practiced in this kind of work, which, as for some 20 years the Italians have done nearly all of it, is naturally the case.

Train Tonnage.*

Decreased freight rates and increased prices of material and wages have so reduced the margin between income and cost that to increase train tonnage seems to be the only way to maintain or reduce the present cost of freight transportation per unit, and train tonnage may properly be termed the paramount issue at this time. Hence transportation talent is largely engaged in devising ways and means to increase train and car loading, which is really a difficult thing to do without first increasing the facilities for it; therefore, it is a very interesting problem to solve. The ordinary way is to reduce grades, eliminate curves and provide heavier locomotives. Of course, any of us can take a big engine and haul a heavy train and thus make a good showing in train tonnage, but to do without these advantages is harder.

On some lines every other consideration has been set aside and the utmost is being done to increase the train load. Such a policy is questionable. It is one thing to haul heavy trains over a division that do not exceed the siding capacity or cause payment of excessive overtime; also, that maintain reliable and regular service so necessary to meet competition. It is another thing to disregard every consideration by overloading trains, thus causing interference with other traffic and doubling hills, resulting in serious delays which cause complaint from the freight department and uneasiness of employees; further the long hours required for the trip are not conducive to fuel economy. Reasonable, just and practical methods beget the hearty co-operation of despatchers, enginemen and trainmen; also, of the freight department and the mechanical department, and these are essential elements. On the other hand, arbitrary requirements handed down by authorities without consulting those who have to execute them, do much to bring about disaffection and disaster. To properly and economically load and operate trains is an art which is acquired only by studious and constant attention and experience.

To promulgate a rate sheet and enforce it absolutely is not always productive of best results. Experience has shown that the rating must be flexible and be changed with every varying condition of a diversified traffic, especially on lines doing a business where the freight varies from merchandise lading of 18 tons, including the car to the heavier commodities averaging up to 65 tons. When mixed they haul uniformly, but a solid train of either shows at once the imperfections of a rating compiled without consistency; hence the necessity for a provision that each train be loaded on its merits in order to get maximum results.

Lubricating Side and Center Bearings.—There has been considerable discussion in the railroad clubs recently as to the merits of lubricating side and center bearings of freight cars, and it has been stated that to do so reduced flange friction to the extent that an increased train loading was possible. To determine this question definitely we made a series of tests with a dynamometer car between St. Louis and Spanish Lake, a part of the line having 0.5 grade and 3 deg. curves. Twenty-six loaded cars weighing 900 tons comprising those of several lines were taken indiscriminately and used. After making a series of four tests at speeds of 10, 15, 20 and 25 miles an hour, each car was raised off its bearings and the center plates partly filled with Galena car oil, the side bearings were swabbed, and then, after 14 hours, another series of four tests at the same speeds above mentioned was made.

The data obtained as a result of these tests seem to warrant the statement that there is very little to be gained by such lubrication; in fact, there was no perceptible difference either in the normal or curve resistance of the train, and the conclusion seems to be a safe one that to oil center or side bearings as they are being constructed at present does not diminish train resistance. In some other tests made to secure data for the purpose of making changes that would enable us to increase train tonnage, some figures were obtained that differ materially from what has been generally accepted as curve resistance heretofore, the merits of which tests I will not discuss at this time.

Actual Increase of Loads.—On the St. Louis, Keokuk & Northwestern Division of the Burlington Route the train load has been increased as follows:

Year.	Cars.	Tonnage.
1895	21.99	580.20
1896	24.68	646.34
1897	25.54	686.20
1898	26.58	768.58
1899	27.94	785.87
1900	28.06	834.27
1901	28.98	882.05

These figures represent the fiscal year ending in June, and since that the train load has been increased more rapidly by reason of certain changes in service which were made for that purpose, bringing the average train up to 31.82 cars, 889 tons, in September, and 32.91 cars, 911.66 tons, in October; the latter being an increase of 49 per cent. in cars and 57 per cent. in tonnage over the annual figures of 1895. A noteworthy individual performance occurred between Hannibal and Burlington, where one engine hauled an average of 3,266.9 tons, 99.6 loaded cars, each day during last October, a grand total of 3,134 cars and 101,275 tons in 31 days.

During the time that the train tonnage was gradually being brought up to the high-water mark the consumption of fuel was not materially increased per unit. In fact, during September and October, a very creditable showing was made in that respect. Also the percentage of loaded freight car mileage was increased from 61 per cent. to a fraction over 86 per cent., and the indications are good for still further improvement. The physical condition of the line generally has been much improved, but the grade is practically the same, and no new freight engines have been purchased, although one of somewhat larger type than the standard has been recently assigned to this Division.

It is not the purpose of the writer to go into details and show the methods employed in bringing about these results, but to show in a general way what can be done by intelligent effort, and the fusion of all those interested from the management to the men.

*A paper presented before the St. Louis Railway Club, Dec. 10, by Mr. Henry Miller, Assistant Superintendent of the Burlington Route.

The New Railroad Terminals at Washington.

As the result of conferences held at Washington during the past few weeks between the Commissioners of the District of Columbia, the U. S. Senate Committee on the District of Columbia, the Park Commission, President Cassatt of the Pennsylvania Railroad and other railroad officers, respecting the new railroad terminals for Washington, a new bill was introduced in the U. S. Senate on Jan. 8 by Senator McMillan, Chairman of the Senate Committee on the District of Columbia. The new bill does not repeal the bills approved last February and providing for new separate terminals for the Pennsylvania and Baltimore & Ohio railroads, which were described in this column at the time, but only changes the provisions of those acts so far as is necessary to meet the requirements of a Union passenger station and terminals such as have now been agreed upon.

It is provided that the new terminals shall be built jointly by the Baltimore & Potomac Railroad Co. and the Washington Terminal Co. recently incorporated. The bill provides that, entering the city, the Baltimore & Ohio lines shall run as at present to Eckington on the Metropolitan Branch and Montello on the Baltimore Branch, from which points they will converge to meet east of the settled part of Eckington, where they will be joined by the Baltimore & Potomac line, which will cross the country at grade from a point on its present line near Magruder Station, in Maryland. The united lines will enter the city along Delaware avenue N. E., over a masonry viaduct widened from 80 ft., as proposed in the old bill, to 120 ft., or to be "wide enough" to accommodate the tracks of both roads. As it approaches the station the viaduct is to widen until it reaches First and I streets N. E., where the station begins.

Extending 300 ft. on each side of Delaware avenue the length of the station will run from I to F streets, and will end at the north line of Massachusetts avenue, on

which it will have a frontage of 800 ft., being about four blocks northeast of the present B. & O. passenger station. The front of the station will be faced by a large circle to be laid out by the District, and the opening of several additional streets is provided for; also the closing of some streets and the carrying under the viaduct of a number of others. The companies are given power to condemn the necessary land for the station building, which is to be monumental in character, to cost not less than $3,000,000, and the terminals are to be completed within five years from the date of the approval of the act.

On the south side of the city, the present Baltimore & Potomac station and tracks on the Mall are to be abandoned, in consideration of which the United States Government is to pay that road $1,500,000. An equal amount is to be paid the Baltimore & Ohio jointly by the United States Government and the District of Columbia. The connection of the Southern roads with the Union station is to be made by a line leaving the present tracks at Virginia avenue and Second street S. W. Curving to the northeast and crossing First street S. W., Delaware avenue, Canal and South Capitol streets, it will pass under the intersection of D street and New Jersey avenue S. E., and enter the tunnel just west of New Jersey avenue and B street S. E., and run through the tunnel which will be over 4,000 ft. long and built under the line of First street S. E., which street divides the grounds of the Capitol and the Library of Congress. From the tunnel the tracks will emerge directly into the station where the through tracks will be about 20 ft. lower than the tracks for trains having Washington as their final destination or first point of departure. A great deal of filling will be necessary to bring Massachusetts avenue and the adjoining streets up to the proposed grade, and the damage to surrounding property may be so great as to cause some modification in this part of the plan.

The bill also provides in great detail for abolishing all grade crossings within the city, for a freight terminal for the Baltimore & Ohio at Eckington, and for necessary or desirable contracts between the railroad and terminal companies. All the plans must be approved by the District Commissioners before work is commenced, and insofar as public parks are affected the Secretary of War must approve them, while the underground construction is to be submitted to the approval also of the Superintendent of the Library of Congress; and the company or companies undertaking the work shall deposit with the Commissioners of the District of Columbia an amount of money sufficient to pay the cost of inspection by the District.

Preliminary plans for the Union station and the entire project were filed with the District officers on Jan. 9 by Mr. William H. Brown, Chief Engineer of the Pennsylvania Railroad, who went over the plans with the Engineer Commissioner of the District, Col. Biddle, Corps of Engineers, U. S. A., and his assistants. The plans are for a building 800 ft. wide, two stories high, and built of white stone or marble and to cost more than the required sum of $3,000,000. The first floor of the station will be used for waiting rooms, ticket offices, etc., while the second story will be used for offices. The style of architecture contemplated will be effective, and three domes on top will give a finish similar to the Capitol and Library buildings.

American Society of Civil Engineers.

The annual meeting of the American Society of Civil Engineers was held in New York, Wednesday and Thursday of this week. The programme was published by us last week. The first meeting was at 10 o'clock Wednesday morning. Officers were elected at that meeting as follows:

President, Robert Moore, St. Louis, Mo.

Vice-Presidents, John R. Freeman, Providence, R. I., and Charles C. Schneider, New York City.

Treasurer, Joseph M. Knap, New York City.

Directors, Richard S. Buck, New York City; George H. Pegram, New York City; William J. Wilgus, New York City; William Jackson, Boston, Mass.; Edmund F. Van Hoesen, Amsterdam, N. Y.; James L. Frazier, San Francisco, Cal.

REPORT OF THE BOARD OF DIRECTION.

The report of the Board showed a total membership, Jan. 1, 1902, of 2,528, of whom 597 are resident members. The net gain during the year was 191; two years before it was 329. The total number of applications for membership during the year was 375. The volume of printed matter issued in the matter of candidates and their election amounts now to 224 pages in the year, or 168,000 words.

The growth of the library during the year was considerable, due partly to the stimulating effect of the issue of the catalogue. The bound volumes received during the year numbered 804, and the unbound volumes, 4,996. The library now contains 9,612 bound volumes, 25,243 unbound volumes, and numerous specifications, maps, charts, etc. Some 3,400 more or less complete volumes of unbound periodicals were looked over during the year and it was decided to bind 1,100 volumes of these.

The awards of medals and prizes for the year ending with the month of July, 1900, were announced at the annual meeting of 1901, and appear in this report. Although these have been published before we repeat them now, namely: The Norman medal to James A. Seddon, for a paper on River Hydraulics. The Rowland Prize to Allen Hazen for a paper on The Albany Water Filtration Plant; the Collingwood prize for juniors to Robert P. Wood, for a paper on Street Grades and Cross Sections in Asphalt and Cement.

The balance of cash on hand, Dec. 31, 1900, was $9,930. The receipts from current sources during the year amounted to $56,501. The payments on audited vouchers amounted to $45,437, and $5,000 was paid on the principal of the mortgage on the property. The balance in the hands of the treasurer is $15,993. The assets of the Society are estimated at $285,649, putting in the building and lot at cost which probably is considerably below the present value.

The following are the awards of medals and prizes for the year ending July, 1901:

The Thomas Fitch Rowland Prize to L. G. Montony, Assoc. M. Am. Soc. C. E., for his paper entitled, "The Ninety-Sixth Street Power Station of the Metropolitan Street Railway Company, New York."

The Collingwood Prize for Juniors to F. A. Kummer, June Am. Soc. C. E., for his paper entitled, "A Proposed Method for the Preservation of Timber."

No award of the Norman Medal was made.

The President of the American Society of Civil Engineers.

At the annual meeting of the American Society of Civil Engineers, held this week, Mr. Robert Moore was elected President. He has fairly won this great honor by his long service to the profession. His industry and ability as an engineer and, above all, his reliable solidity of character have been better and more widely known each year for, now, some 30 years. Below is a brief outline of his work. Of course, this gives only a hint of its real extent and value.

Mr. Robert Moore.
President American Society of Civil Engineers.

Robert Moore was born at New Castle, Pa., June 19, 1838. His father, Henry C. Moore, was a civil engineer, as was also his mother's father, Charles T. Whippo, who was for some time Chief Engineer of the State Canal from Beaver to Erie, Pa. When the son was about two years old his father was appointed Chief Engineer of the Whitewater Canal, then under construction by the State of Indiana. After completion of the canal his father was employed as engineer in the building of railroads in Indiana and Ohio. In a number of surveys the son, during his school vacations, acted as flagman and rodman.

In 1858 he graduated from Miami University, at Oxford, Ohio, and after a few years took up the work of a civil engineer. One of his first professional engagements was in military service as an Assistant United States Engineer at Camp Nelson, Ky. Since then his work has been mainly the location and building of railroads in the States of Illinois, Indiana, Ohio and Missouri. Nearly two years were spent at Springfield, Ill., as chief engineer of a road which is now a part of the Baltimore & Ohio Southwestern. He was for a year Chief Engineer of the Terre Haute & Indianapolis Railroad; after this (1869-70) as chief engineer, he built a railroad from Belleville to Duquoin, Ill., now a part of the Illinois Central Railroad. He then assisted his father in completing a railroad from Pleasant Hill, Mo., to Lawrence, Kan., part of which is now in the main line of the Atchison, Topeka & Santa Fe. In 1872-73 he completed, as Chief Engineer, a road from Lorain to Urichsvile, Ohio, now a part of the Cleveland, Lorain & Wheeling Railroad. Some time was then spent in miscellaneous work, including the location of the eastern half of the Indiana, Decatur & Western.

In 1877 Mr. Moore was appointed Sewer Commissioner and member of the Board of Public Improvements of the City of St. Louis, of which board the President was Henry Flad, Past President Am. Soc. C. E. In this position he remained until 1881, when he resigned his commission to engage again in railroad work, in which, as constructing and consulting engineer, he has remained till now.

During this time he has built several short lines of railroad, including the St. Louis, Peoria & Northern from St. Louis to Peoria, now belonging in part to the Illinois Central, and in part to the Chicago & Alton. He also built the elevated viaduct of the St. Louis Merchants' Bridge Terminal Railway Company, of which he was Chief Engineer. He has also acted as consulting engineer for the St. Louis & Illinois Bridge Company, owning the Eads Bridge, for the St. Paul & Duluth, for the Toledo, Peoria & Western, for the Reorganization Committee of the St. Louis & Southwestern and for the Reorganization Committee of the Atchison, Topeka & Santa Fe. In 1896 he represented the Los Angeles Terminal Railroad in the harbor controversy, which resulted in selection of San Pedro as the deep water harbor of the Southern California coast. In 1897 he was a member of the Brazos River Board, which reported to Congress upon the works at the mouth of the Brazos River and their value to the government. In 1899 and 1900 he was a member of the Southwest Pass Board, which reported to Congress a plan with estimates for deepening to 35 ft. the Southwest Pass of the Mississippi River. He is now building, as Chief Engineer, the Southern Missouri Railway, and acting as consulting engineer for the Toledo, Peoria & Western, for the Terminal Railroad Association of St. Louis, operating the two bridges over the Mississippi River, and for the Chicago, Burlington & Quincy.

He has been a member of the American Society of Civil Engineers since April, 1877; a member of the Institute of Civil Engineers since December, 1887, and has twice been President of the Engineers' Club of St. Louis; and he is also a member of the Board of Education of St. Louis, and President of the Academy of Science of the same city.

Equations Expressing the Power of Locomotives.

In a paper before the New England Railroad Club, Prof. W. F. M. Goss elaborated a study which he briefly presented at the Master Mechanics' Association last summer, and which has already been a subject of discussion in the *Railroad Gazette* (August 16, Sept. 13, Nov. 1, 1901). Omitting all consideration of the process involved in his deductions, we pass at once to certain of his conclusions. These are in the form of two equations, one expressing tractive force equivalent to work done in the cylinder, assuming no loss between cylinder and drawbar, and the other giving the actual force exerted at the drawbar, as corrected for losses due to machine and rolling friction and to the wind resistance offered to the locomotive. The data required to be known to permit a determination of these values for any engine depend upon the dimensions of the engine and are only such as are commonly available.

The equations are as follows:

$$T = 375\,\frac{0.43\ H}{S} = 161\,\frac{H}{S}$$

and

$$t = 161\,\frac{H}{S} - 3.8\,\frac{d^2\,L}{D} - W\,(2 + {}^1/_6\,S) - 0.11\,S^2$$

In which the characters employed, signify as follows:

T = Tractive force in pounds equivalent to the power developed in the cylinders, assuming no loss in transmission.
H = Square feet of heating surface in boiler.
S = Speed in miles per hour.
t = Tractive force in pounds equivalent to cylinder power corrected for all losses between cylinders and drawbar, including machine friction, resistance of rolling load, and atmospheric resistance.
d^2 = Diameter of piston in inches.
L = Length of stroke in feet.
D = Diameter of drivers in feet.
W = Tons of weight of rolling load, including that on trucks and tender, but excluding that on drivers.

Since T gives the drawbar stress, assuming no loss in transmission from the cylinder to the drawbar, and *t* gives the drawbar stress as corrected for all losses in transmission, it will be seen that differences in the results obtained by using these two different equations must be the loss incident to the transmission of power from the cylinders to the drawbar.

It is not claimed that these equations possess a high degree of accuracy, but that they are sufficiently accurate to serve every purpose which is likely to arise in service.

The Sanitary Conditions of Nicaragua and Panama.

In the *Medical News* (New York, Jan. 4) appears a study by Mr. George A. Soper, Ph. D., on the "Sanitary Aspects of the Panama Canals." This important subject is carefully treated in a paper of more than 5,000 words and by the help of many authorities. We can give space only to the conclusions, which follow:

The principal conclusions reached in the foregoing inquiry

may be conveniently brought together in the following categorical order:

1. Both the Panama and Nicaragua routes pass through a country which is extremely unfavorable to health.

2. The climate of Nicaragua and Panama differ chiefly with respect to rainfall, the precipitation on the Panama route being distinctly the less unfavorable to health.

3. Considerations of soil, topography and the nature of the engineering work to be done are in favor of Panama. Fewer men would be required; they would be concentrated and, hence, their health could be more easily protected.

4. There is practically no difference in the nature of the diseases to be anticipated, nor in the precautions to be taken to protect health in either case.

5. After construction, the difficulty of controlling health conditions along the line would be greater on the Nicaragua route.

6. The shorter Panama route would cause passing vessels to be exposed to the possibilities of infection for a much briefer interval. The danger of communicating diseases to and from the Isthmus is fairly represented by the difference in time which it would take ships to pass from ocean to ocean by the two routes.

7. The likelihood of the canal becoming a disease focus, thus interfering with commerce, by requiring all healthy ports to quarantine against ships passing the Isthmus, is much greater in the case of Nicaragua than Panama.

8. Although the Panama health records are much darkened by heavy losses of life by disease, this is not to be construed as evidence of the existence of conditions favoring a greater immunity from sickness along the Nicaragua line. More lives have been lost at Panama because more lives have been unnecessarily exposed. The experience of Panama is to be taken as a warning of conditions which are liable to be repeated on either route.

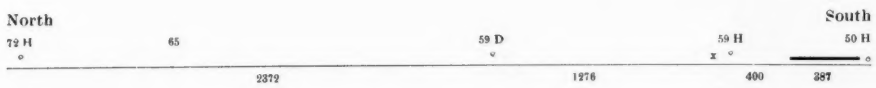
9. Whichever canal is selected, extraordinary care will be required to maintain satisfactory health conditions during construction and after completion of the work.

10. Plans and preparations in detail for the organization of an efficient sanitary and medical department should be made as early as possible so that the measures necessary for the prevention of disease may be carried on in harmony with the engineering projects.

The Fourth Avenue Tunnel Collision.

The rear collision of passenger trains in the tunnel at the approach to the Grand Central Station, New York City, on Jan. 8, was briefly reported in our last issue. The main facts are as they appear in that account. The total number of casualties is 15 passengers killed, and 41 passengers and one trainman injured. Of the injured passengers two have since died. The injured trainman is Engineman Wisker of the White Plains train. (Some accounts spell the name Wischow.) Of the passengers killed four are said to have died from the effects of steam inhaled. One of the city firemen who helped to take out the injured persons says that one or more passengers were scalded by steam from a ruptured heating pipe in the car next to the last car, but the fatal scalding appears to have been caused by steam from the front end of the locomotive. All of the persons killed and nearly all of those injured lived in New Rochelle, N. Y., the last car of the train having been reserved for passengers boarding the train at that place; and the excitement there ran high. A public indignation meeting was held on the third evening following the accident. It appears that the woodwork of the rear passenger car was set afire by coming in contact with the fire or the fire-box of the locomotive, but the flames were soon extinguished. Flagman Barnum, of the New Haven train got back about 500 ft. with his red lantern. Seeing that the train was not slackening he threw his lantern into (or at) the window of the cab of the locomotive.

The situation of the different signals as related to one another and the distances between them are shown in the sketch below. The block sections shown are 3,648 ft. and 787 ft. long, respectively. The foremost train, proceeding southward, had been stopped at the Fiftieth street home signal (50 H). From the rear end of this train back to the Fifty-ninth street signal was 400 ft. The New Haven train, by the way, had started and had moved a few feet before it was struck. From Fifty-ninth street home signal (59 H) back to its distant signal (59 D) the distance is 1,276 ft.; and from this signal back to the home signal (72 H) at the entrance



to this block section is 2,372 ft. The small x in the sketch indicates the position of the Fiftieth street distant signal. This signal is on a short vertical shaft, while the home signal near it is on a tall shaft of the same kind.

The grade of the road from Sixty-fifth street (65) to Fifty-ninth street is descending; from Fifty-ninth street to Fifty-seventh it is level; and from Fifty-seventh to Fifty-second street (some distance beyond 50 H) the grade is ascending at the rate of 65 ft. to the mile. The flagman of the New Haven train got back to x before he met the Central train. Just before the train reached him a northbound engine filled the atmosphere with smoke and steam so that he could not see the Central train until it was close upon him; and doubtless it was equally difficult for the Central engineman to see him.

At 59 D the fireman shouted "green" (caution) but does not know that Wisker heard him. On approaching 59 H he saw the red light, shouted again, and ran for the tender.

The collision was due to disregard of the block signal. The engineman of train 118, J. M. Wisker, appears to have passed the distant signal approaching Fifty-ninth street without observing it, although his fireman, Fyler, called Wisker's attention to it as above stated. When they came close to the Fifty-ninth street home signal Fyler observed it was red, but at the same moment saw that the train ahead was standing still and that Wisker would not be able to stop before striking it. Fyler, therefore ran to the tender and saved himself. Wisker was not seriously injured physically. The torpedo at Fifty-ninth street home signal exploded all right; but it was then too late to materially check the speed of the train. Officers of the road have stated that the speed at Seventy-second street was about 30 miles an hour and at the point of collision about 20 miles an hour; but the way in which the passenger car was crushed indicates that this estimate is far too low. The passenger car which was wrecked was No. 477 of the New York, New Haven & Hartford, a standard day coach, 63 ft. long over buffer timbers, and about 10 or 12 years old, built by Barney & Smith.

The weight of the New York Central train was about 305 tons.

Engineman Wisker is said to be 42 years old. He began service on the Harlem Division as fireman, in 1895, and passed an examination for promotion to engineman on Aug. 5, 1901. His record up to this time has been "first class." Fireman Fyler is 28 years old, and was employed as fireman in October, 1900. He had been a fireman in the United States Navy, from which service he was honorably discharged.

Both Wisker and Fyler were arrested soon after the collision. Fyler was admitted to $5,000 bail, but Wisker was held three days without bail, when, on recommendation of District Attorney Jerome, he was released on $10,000 bail. Bail was given, or provided for, in both cases by the railroad company, and it is said that officers of the company announce their intention of giving Wisker employment of some kind.

The signalman at Fifty-ninth street was arrested, but as soon as Mr. Jerome appeared on the scene and learned the facts he ordered him released.

The investigation which is to be made by the State Railroad Commissioners and the Coroner was begun on Thursday of this week.

Reports in the daily papers had much to say about the smoke, fog, and darkness in the tunnel immediately after the collision. From the testimony of passengers and others it appears that there was practically no fog, but there was a very light snow falling. A disinterested railroad man, who was on one of the trains, said that the tunnel was as light as ever it was at that hour in the morning at this time of year. The steam and smoke from the wrecked locomotive caused some of the darkness referred to by the reporters, and it seems quite evident that this was the only cause, except that the worst portion of the wreck stood immediately beneath the overhead bridge at Fifty-sixth street.

Another Ship to Burn Liquid Fuel.

The "Trocas," one of the Shell Trading & Transport Line vessels, equipped with liquid fuel-burning apparatus, had a trial trip recently off the mouth of the Tyne, attended by about 80 leading ship owners and ship builders. There were also present representatives from the two great German lines, Hamburg-American and North German Lloyd, as well as several engineers from the admiralty and representatives of Lloyd's register and Bureau Veritas. The apparatus with which the "Trocas" is furnished consists of pumping and filling arrangements for converting the fore and after peaks, the fore and after cofferdams, and the ballast tanks underneath the engines and boilers, into liquid fuel tanks, thus turning to account spaces useless either for cargo or bunkers, and leaving free for other purposes, the ordinary coal bunker space. In the "Trocas," which is an oil tank steamer as well as a general cargo vessel upon the system peculiar to Messrs. Samuel's Shell Line steamers, it will be when carrying general cargoes homewards from the east that the additional space will be most valuable; but in the case of vessels always carrying general goods a portion at least of the bunker space will be available for cargo when the ballast tanks and peaks are utilized for storing the fuel.

The furnaces do not differ materially from the ordinary arrangement of furnaces for burning coal. The fire bars are left in place and are the same. The bridge of firebrick at the end of the furnace is in the same position, but is somewhat more heavily bricked, and the additional interior arrangements of the furnace consist of an arch of firebrick immediately over the bridge, and a lining of firebrick at the back of the combustion chamber extending about as high as the middle row of tubes, and intended to receive the impact of the flame as it rushes through the furnace under the impetus of the steam and oil jets. These jets are produced by two tubular injectors, each of about 1½ in. internal diameter, with annular openings adjustable by ordinary hand wheels on the Rusden and Eeles' system for the steam and oil, the inrush of the steam breaking up the oil into particles like rain, and facilitating its immediate conversion into flame. The fire bars are protected against the strong heat by having broken firebrick upon them to a depth of 6 or 8 in. The furnace fronts and the fire doors are similar to those of ordinary pattern, excepting that there are three circular holes in each front, two for the reception of the injectors, and one a sight and air hole. The injectors themselves swing upon jointed pivots, admitting the passage through them of the steam and oil as required.

The liquid fuel is pumped from the main receptacles already mentioned to settling tanks which are placed in the 'tween-decks some 20 ft. or more above the level of the fires. These settling tanks are disposed upon the patented arrangement known as the Flannery-Boyd system, in which they are capable of alternate use or of assisting each other in separating water from the oil before it is allowed to enter the furnace. The liquid fuel, after being pumped into these receptacles by pumps in the stokehole, and after being freed from any water, is allowed to fill by gravity through pipes to the swivel-jointed injectors already described, and the action is complete. The whole apparatus is remarkable for its simplicity, and was pronounced by all the engineers on board to be freer from complication and multiplicity of parts than anything which had previously been seen, although some 50 steamers have been fitted with liquid fuel apparatus by the Wallsend Slipway & Engineering Co., which executed the contract on the "Trocas," and although there are many other steamers running with liquid fuel apparatus which have been fitted by other engineering firms.

The trial was more of a demonstration than a scientific experiment to ascertain data, the time allowed being much too short for any reliable figures to be obtained. The vessel got under way at 12:30 p.m., and steamed until 3 p.m., at ordinary voyage speed of about 9½ knots, making 9.9 knots on the measured mile. At 3 o'clock the visitors were invited to specially enter the stokehole for the purpose of witnessing the ease with which the fuel apparatus could be changed to coal burning. The forward boiler—there are three boilers in the "Trocas," each with three furnaces—was first taken in hand, the flame being put out by simply closing the valves, the firebrick which had hitherto protected the bars being raked into the stokehole, coal being then laid upon the bars without the usual preparation of chips and shavings. The fire doors were immediately closed, the oil and steam again turned on and lit for the purpose of igniting the coal.

The first boiler was steaming under way with coal in 9½ minutes from the time it had been shut off from steaming under oil. The same process was applied to the other two boilers in their turn, and the vessel was continuing her way under coal in just half an hour from the time she temporarily ceased to be steaming on oil. The engines were not stopped, but were slowed down from about 60 to 50 revolutions, and the simplicity of the apparatus was still further demonstrated. Whilst the vessel was under oil the flame was observed to be very clear and intensely hot, and of course of almost absolute steadiness, the steam not varying but being so plentiful that the safety valves blew off from time to time. There seemed little doubt that there was power enough in the boilers to enable one boiler to be laid off and the engines to be driven at their ordinary speed by the two remaining boilers.—*Marine Review.*

Massachusetts Commissioners' Decision as to Competing Express Companies.

The Railroad Commissioners of Massachusetts have denied the petition of James M. Llewellyn for a recommendation to train privileges for the purpose of a local express business between Boston and Rockland. The decision is as follows:

This petition is brought under the law to be found in Section 241, Chapter 111 of the Revised Laws. The Legislature has restricted the number of persons who shall engage in the express business to those who receive a recommendation from the Board. This recommendation must be based upon something more than proof of the good character and ability of the applicant, and the benefits supposed to arise from competition. The petitioner admits this, and bases his petition upon the unsatisfactory character of the present service.

The New York & Boston Despatch Express Company is engaged in a local business between Boston and Rockland in connection with a general business over the entire system of the New York, New Haven & Hartford Railroad. The firm of Jenkins & Simmons also carries on a local express business between Boston and Rockland. No evidence has been given which reflects upon this firm. Statements of men who have had dealings with the New York & Boston Despatch Express Company show slow deliveries and a treatment of patrons wanting in a spirit of accommodation. This sug-

gests either an exceptional indifference to what it considers an unimportant part of a large business, or a general indifference to the way in which it serves the public. Either indicates lack of wisdom, as well as failure of obligation on the part of the management. The effort to please people is inexpensive; and economy in this direction is a species of thrift that in the end proves unprofitable.

Moreover, it seems that this company, holding out what purported to be a tariff of rates for everybody, has in many instances made reductions from it for the benefit of certain persons. Nothing is less defensible than secret dealing behind the cover of a published tariff.

Nor is this all. The petitioner Llewellyn has for some time been engaged in forwarding goods between Boston and Rockland by the use of the freight trains. At times he has been compelled to use the express company. It seems that whenever he has had occasion to do so, he has been obliged to pay higher rates than those charged others. The excuse offered, that Llewellyn is a competitor, shows a misconception of what was due to him and a pettiness of dealing out of place in large affairs.

Unsatisfactory service upon the part of one company having been proved, the question is as to the remedy. It appears that the railroad company shares in the profits of the express business. Whatever the mutual relations between the two companies, and however responsible each as a common carrier, exclusive express privileges upon a railroad ought not to be granted at the expense of the public convenience. Be the arrangement between the railroad company and the express company what it may, its continuance should be made contingent upon reasonable charges, prompt delivery, and impartial dealing.

The railroad company contends that the remedy in this case for any improper conduct by the express company is not in increasing the number of those engaged in the business. The firm of Jenkins & Simmons makes the same claim, and urges that there are enough expressmen in business at Rockland; in fact, that there would be no profit to anyone if another were admitted to it. The evidence before us all goes to show that the business is not too large for efficient conduct by those now engaged in it.

As a general rule it is obviously better that a few persons rather than many should undertake to handle goods upon passenger trains, where time and space are necessarily limited. The public interests demand the least possible inconvenience and delay to travel. In this instance we believe that satisfactory service can be obtained without adding to the number of expressmen. Should there be further cause for complaint, a remedy can be provided. And we shall consider that there is such cause for complaint unless in the future deliveries are promptly made, and just rates and suitable accommodations are afforded all patrons.

The request of the petitioner must, therefore, be denied, and better service required of the New York & Boston Despatch Express Company.

JAMES F. JACKSON,
GEORGE W. BISHOP,
CLINTON WHITE, *Commissioners.*

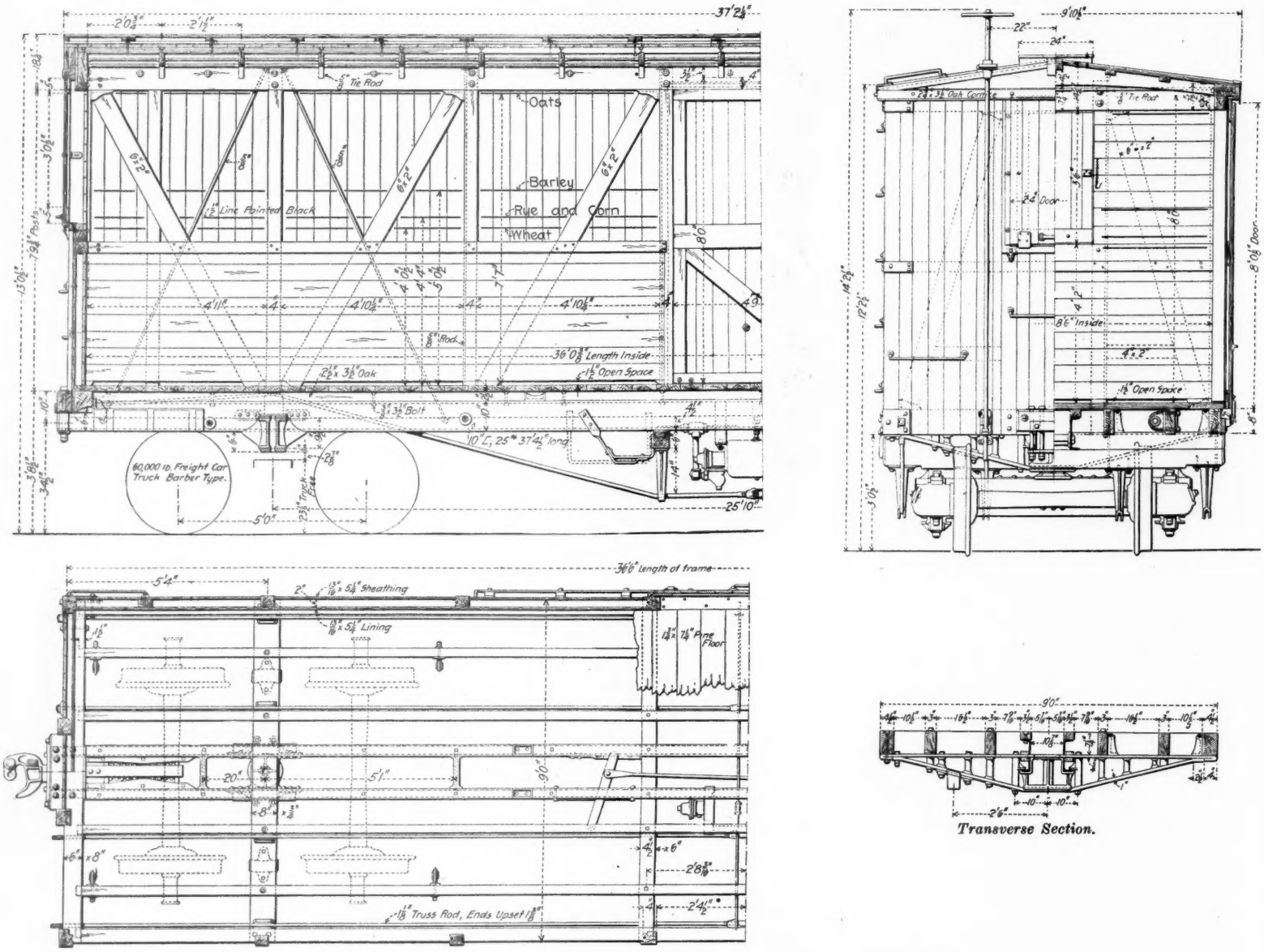
36-ft. Box Car with Steel Center Sills—Chicago, Milwaukee & St. Paul Railroad.

The Chicago, Milwaukee & St. Paul built last year some box cars with steel center sills which embody some new features in body bolster construction, designed by Mr. J. J. Hennessey, Master Car Builder, at the West Milwaukee shops. The drawings of this box car are shown by the accompanying engravings. The inside dimensions conform to the standards adopted by the American Railway Association, the length being 36 ft., the width 8 ft. 6 in., and the clear height 8 ft. The capacity is 60,000 lbs. and the light weight is 31,350 lbs.

The construction of the wooden upperframing is clearly shown by the engravings. The underframe consists of 10-in., 25-lb. steel channels, 4½ x 8-in. side sills, two 3 x 8-in. intermediate sills and 6 x 8-in. oak end sills. Above the center sills are placed oak nailing strips, 2½ x 3½ in., bolted to the top flanges. An ordinary plate body bolster is used, the top plate being ¾ in. and the lower plate 1 in. thick. The top plate of the bolster is level and passes through a slot along the neutral axis of each center sill, so that both the center sills and body bolsters are continuous, and this without weakening either the sills or bolsters. It will be seen that the construction is very simple and compact.

The lower flanges of the center sills are supported on a spider or center casting placed between the upper and lower members of the body bolster, and this casting extends lengthwise under the steel center sills. In the car shown this spider has a bearing on the sills of 20 in., although it may be made longer if desired. These long bearings take all the load through the lower flanges of the center sills, and in effect the construction is practically equivalent to a double body bolster. When this spider and body bolster are bolted together, the upper and lower members of the bolster are held firmly together, and as the openings in the center sills are reinforced by brackets riveted to the metal sills forward or backward movement of the bolster is prevented. The upper center plate is riveted to the bottom of the lower member of the bolster. The drawings show the opening between the upper and lower members of the body bolster as 9½ in., but if it is desired to use a higher truck this can be reduced to 7 in. with safety. Also, any form of draft gear in common use can be applied.

Beside providing a continuous body bolster and continuous metal center sills, this construction brings the pulling and buffing forces in direct line with the metal center sills, which is more and more being recognized as a very important requirement. Another point is that in case of a wreck in which the center sills are damaged, they can be replaced in the same way as the ordinary wooden center sills are replaced, and being commercial shapes the work can be done in any car shop. Mr. Henessey has been granted patents covering this arrangement of metal center sills, a continuous body bolster passing through slots in the neutral axis of the sills, and the central casting. So far as we know this is the first design brought out for continuous center sills and bolsters where one or the other is not weakened.



36-Foot Box Car of 60,000 lbs. Capacity, with Steel Center Sills—Chicago, Milwaukee & St. Paul Ry.

These box cars have low diamond frame Barber trucks. The first box cars having this sill construction were turned out last May and a recent examination of those longest in service shows an excellent general condition. All parts are as firmly in place as when the cars were first put into service.

Foreign Railroad Notes.

It is proposed to establish in Vienna a Central Railroad Library, by uniting, so far as possible, the books relating to railroads in other collections in the city. The Railroad Ministry is said to have about 20,000 volumes of railroad books, the Austrian Railroad Club 3,200, the various railroad companies 2,000 to 4,000 each.

The Russian railroads (including those in Asia) in 1898 employed 456,751 men, which is at the rate of 17.2 per mile of road worked. As their average pay is $169 per year, the wages paid per mile of road are $2,907. On

the railroads of this country in 1899 only 4.95 men per mile were employed, but they were paid $2,787—nearly as much as the 17.2 Russians. The average pay of the day laborers on the Russian railroads, who were nearly three-eighths of the whole force, was $126. The number of men employed in guarding and maintaining the track alone was 6¼ per mile.

The Journal of the German Railroad Union of Nov. 13 says that in the experiments with high speeds on the Military Railroad a speed of 160.2 kilometers (99½ miles) per hour has been attained, and that the air resistance at such speed has been found less than was expected.

Prairie Type Passenger Locomotive with Traction Increaser—Atchison, Topeka & Santa Fe.

An illustrated description of one of the 40 Santa Fe Prairie type passenger locomotives built by the Baldwin Locomotive Works, was given in the *Railroad Gazette*, Nov. 22, 1901. A review of the most recent additions to the heavy passenger locomotive equipment, with a summary of difficult work that is done on the Santa Fe, was given in an editorial in the same issue. We there mentioned a Prairie type locomotive that was being fitted with traction increasers, and withheld the drawings and description until the locomotive was built and tried. It is No. 1017, Class P-14-A, and has been running "first in, first out" at Topeka for some weeks.

We are informed that it is well liked by engineers on the fast and heavy trains; that it never slips the driving wheels, and that it is so satisfactory that a large number like it, including 45 now being built at Baldwins, will be built this year. Meanwhile, the American Locomotive Co. has two of them, with four-cylinder tandem compound cylinders, about finished at Schenectady.

The general description and illustrations of locomotive No. 1000, given in our issue of Nov. 22, will do for locomotive No. 1017, except in weights given and in regard to the traction increaser. The illustrations here given show two ways of applying the increasers, both designed and patented by Mr. John Player, and both to use compressed air from the air-brake system to operate them.

The smallest diagram shows a continuous system of "brake-levers" and bell-cranks to operate the increasers, the air cylinder being placed at a convenient point under the runboard. This system has not yet been used.

The arrangement used on No. 1017 is shown in the biggest diagram, with front and back cross-sectional views. The details of front and back apparatus are shown in larger scale, and the three-way cock, that controls both increasers automatically by the movement of the reverse-lever, is shown completely. On this locomotive the leading truck wheels and the first pair of driving wheels are equalized in series and are served by the one-cylinder increaser as shown. The other two pairs of driving wheels and the trailing truck are in series, and are served by a two-cylinder increaser, the uplifting action of which on the back equalizers is plain. The three cylinders are in this case attached to the engine frames.

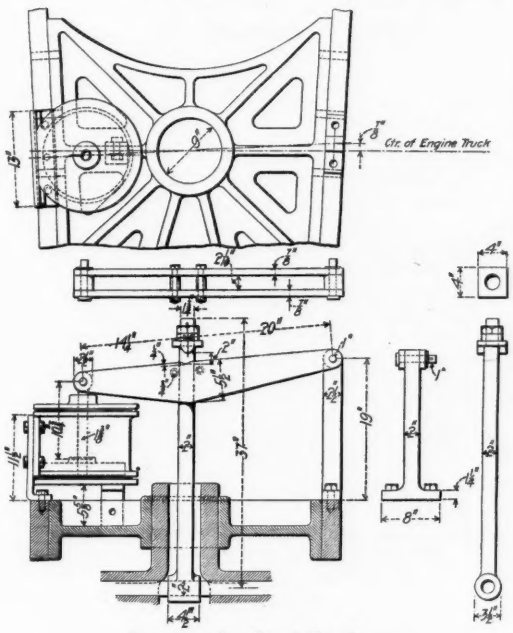
A pipe with an ordinary shut-off valve in it runs through the engine cab and connects the main air drum with the supplementary reservoir from which air is drawn to work the increasers. The traction increasers can thus be cut out entirely at the will of the engineer. From the position and attachments of the three-way cock it is seen that, passing a specified position of cut-off, on the quadrant, the increasers will be automatically applied, whether the locomotive is running forward or backward. The engineer may therefore cut out the action at any time with the shut-off valve, but he can only apply it as ordered. For the present a cut-off of 17 in. is used as the changing point. When the reverse lever is cut back of this point, while using the increasers, the air is cut off from the cylinders and is released from the cylinders through the ports drilled at right angles in the plug of the three-way cock. Those ports register with the lower opening of the shell, to atmosphere.

By referring to our editorial of Nov. 22 and to the weight diagram which is now given, it may be seen that the normal weight on driving wheels is 147,500 lbs. instead of 135,000 lbs., as first contemplated; also that the weight transferred to driving wheels by the increasers, as now arranged, is 8,730 lbs., making the maximum weight on driving wheels 156,230 lbs. The total weight of engine in working order, by scales, is 210,800 lbs.

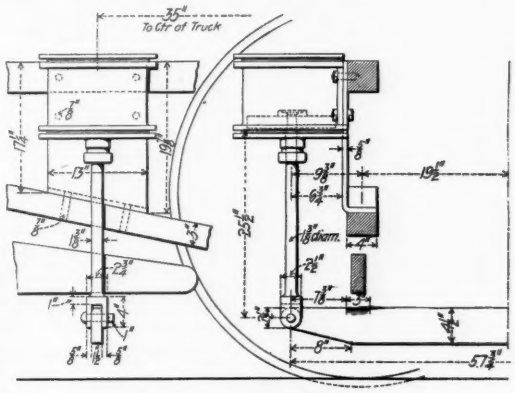
The other figures, similarly obtained, and given in the diagram, are also interesting. The normal weight on the leading truck is 30,150 lbs., and that is reduced to 25,950 lbs. when the weight is shifted. The trailing truck wheels carry 33,150 lbs., normally, and 28,620 lbs. when the increasers are used. The weight on the first pair of driving wheels is thus raised from 46,800 lbs. to 51,000 lbs.; on the second pair from 51,800 lbs. to 53,340 lbs.; and on the third pair, from 48,900 lbs. to 51,890 lbs. This gives a normal main journal load of 25,900 lbs., and a maximum of 26,670 lbs. per journal; probably the greatest used, if single-pair locomotives be excepted. There is, so far, no indication that the journals are overloaded.

The grades and curves out of Topeka, west; the grades near Big Badger and Little Badger creeks; and the big curve near Lang, make a good testing ground for this locomotive, between Topeka and Emporia, on the Denver and California express trains, as well as on lighter runs. The feeling on the Santa Fe, as we understand it, is that the coming of the Prairie type locomotive for passenger train work gave greater occasion than ever before for the use of traction increasers. It is held that with the great total weight that is necessarily carried, a great deal of it being on the trucks, a locomotive having cylinder power enough to use the adhesion that is gained by the traction increaser can well afford to be called over-cylindered normally; that the advantage gained in starting heavy trains and running on slippery rails much more than balances any loss from big cylinders, within reason. This is thought to apply particularly to work where a double-header or a pusher is often necessary to add a small percentage of power to the power of a locomotive that has the required total weight, perhaps, but not the required adhesion and power. Just how soon the traffic department will gage the worth of the traction increaser to a nicety, and proceed to overload it a trifle is matter for "another story."

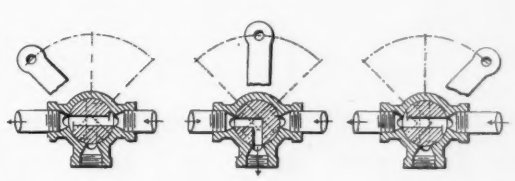
No reports of injury to track have been received, as relating to the heavy journal loads, and it is thought that such trouble has been effectually guarded against by automatically restricting the use of the traction increaser to relatively slow speeds. By properly proportioning the air cylinders and the leverage any desired amount of weight can be shifted, leaving a safe weight on the leading truck. There seems to be a growing feeling that no serious difficulty or menace to safety stands in the way of using traction increasers.

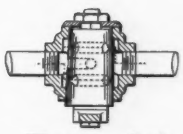


Increaser for Front Truck.

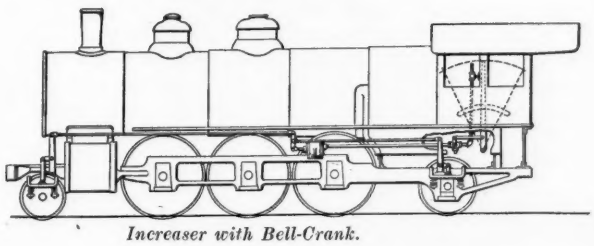


Increaser for Rear Truck.

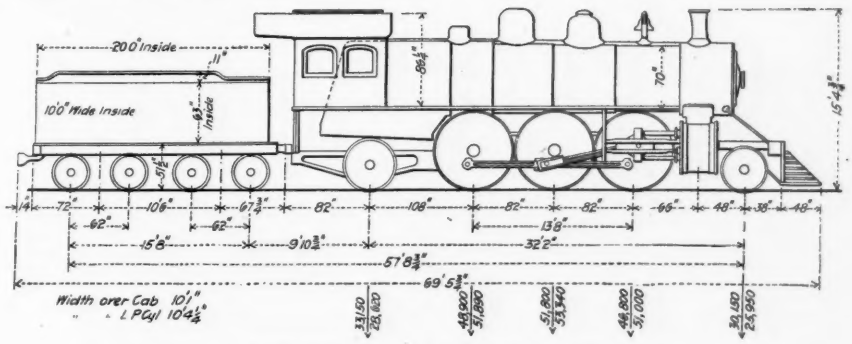




Three-way Cock.

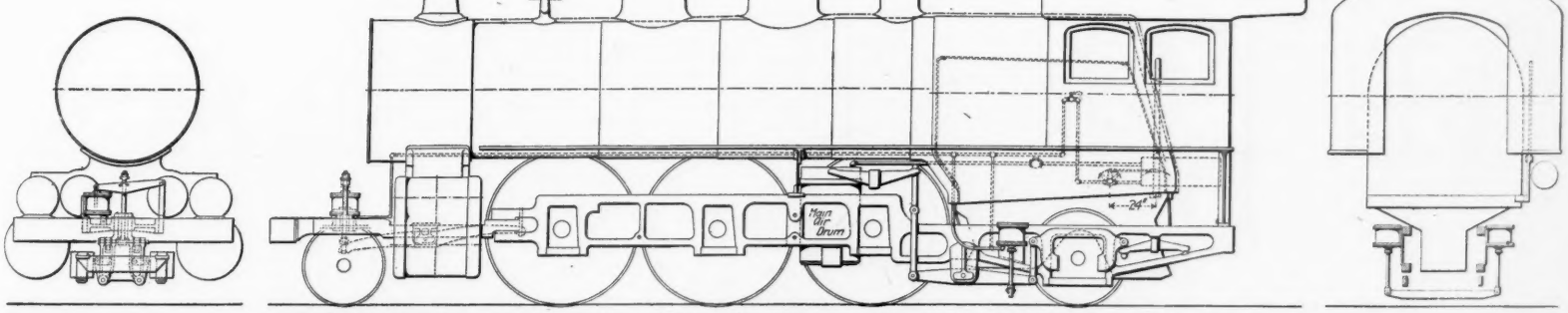


Increaser with Bell-Crank.



Wheel Base.				Weight in Working Order.			
Rigid	Driv'g.	Engine.	Total.	Tend'r.	Driv'rs.	Trucks.	Total engine.
13' 8"	13' 8"	32' 2"	57' 8¾"	112,600	147,500	63,300	210,800
				With Traction Increaser.			
				112,600	156,230	54,570	210,800

Weight Diagram.



Prairie Type Passenger Locomotive with Traction Increaser—Class P-14-A Atchison, Topeka & Santa Fe.

RAILROAD GAZETTE

ESTABLISHED IN APRIL, 1856.
PUBLISHED EVERY FRIDAY
At 32 Park Place, New York.

EDITORIAL ANNOUNCEMENTS.

CONTRIBUTIONS—Subscribers and others will materially assist us in making our news accurate and complete if they will send us early information of events which take place under their observation, such as changes in railroad officers, organizations and changes of companies in their management, particulars as to the business of the letting, progress and completion of contracts for new works or important improvements of old ones, experiments in the construction of roads and machinery and railroads, and suggestions as to its improvement. Discussion of subjects pertaining to ALL DEPARTMENTS *of railroad business by men practically acquainted with them are especially desired. Officers will oblige us by forwarding early copies of notices of meetings, elections, appointments, and especially annual reports, some notice of all of which will be published.*

ADVERTISEMENTS—We wish it distinctly understood that we will entertain no proposition to publish anything in this journal for pay, EXCEPT IN THE ADVERTISING COLUMNS. *We give in our editorial columns* OUR OWN *opinions, and these only, and in our news columns present only such matter as we consider interesting and important to our readers. Those who wish to recommend their inventions, machinery, supplies, financial schemes, etc., to our readers, can do so fully in our advertising columns, but it is useless to ask us to recommend them editorially either for money or in consideration of advertising patronage.*

The High-Speed Brake in Relation to an Accident.

When an event happens, at once so painful and so costly as the New York Central tunnel collision, we ought, at least, to try to see that it is not all pure waste and misery. At least, we may try, humbly and patiently, to find its useful lessons; and we shall consider now, for a moment, the possible bearing of the experience of this accident on air-brake practice.

We wrote recently (page 809) on the matter of the use of the high-speed brake, and especially its use on suburban trains. Has this accident any lesson as to brake practice? So far as we know that must be largely a matter of conjecture. We do not really know the speed of the train when it passed the green signal, or when the emergency brake was put on, or when the train passed the red signal. Obviously, the brake would have done no good unless it was applied at some distance within its range of action—that is, at a distance greater or less, according to the efficiency of the brake. But we may assume certain figures, of the correctness of which we possess some evidence, and which are subject to verification when the testimony is in and made public.

We may assume, for instance, that the train ran at least 40 miles an hour, probably more, rather than less, right up to the red signal. This is not altogether a guess, but we do not care to state it as a fact. We shall assume that the distance from the red signal to the forward end of the locomotive of the rear (White Plains) train, after the accident took place, was 445 ft. And we shall assume that the distance from the red signal to the rear of the New Haven train at the instant of the collision was about 400 ft. It must be borne in mind that the New Haven train was under way, and perhaps this distance will never be known exactly.

A train of five cars, equipped throughout with the Westinghouse quick-action air-brake, in good order, with a brake on the leading truck of the locomotive, has been stopped from 40 miles an hour in 470 ft. With no brake on the truck the distance would be about 500 ft. Probably there was no brake on the leading truck, for this has not yet been put on half the locomotives in the country.

If, then, the train was running at 40 miles an hour when the emergency went on, we may assume that the speed was reduced to about 25 miles an hour when the New Haven train was hit, although we should hate to be pinned down to this as a definite expression of opinion. The rear car of the New Haven train appears to have been in good condition and substantial; and the wreck would indicate something more than 25 miles an hour, we should suppose.

Now, carrying on the assumption that the White Plains train was running at 40 miles an hour when the emergency application was made, what would the high-speed brake have done? We know of no record of the saving of distance by the high-speed brake, at 40 miles an hour. At 45 miles an hour and at 60 miles, the stop with the high-speed brake can be made in about 73 per cent. of the stop of the ordinary quick action brake; and we may assume the same to hold good from 40 miles an hour, although of this we are not certain. On this assumption, if the White Plains train had been equipped with the high-speed brake, it could have been stopped in 365 ft. with no brake on the leading truck of the locomotive—that is to say, in 35 ft. short of the distance between the red signal and the rear of the New Haven train, as assumed above. It appears, then, not highly speculative to conclude this was a case in which the use of the high-speed brake would probably have prevented the accident; and that further it was a case in which the ordinary quick action brake could not have prevented the accident—that is, could not have prevented the accident, because it was not applied at the green signal as it should have been.

Of course, it is understood that the New York Central is well up to average practice in the brake protection of its trains, and on some of its trains it is ahead of the average. While the automatic quick action brake is no longer the highest state of the art for passenger service, it is yet good practice; and it is not likely that a court of law would treat that company as deficient in care and diligence which had not put on the high-speed brake, at any rate, for local runs.

A Danger in Electric Traction.

From all the evidence that we can gather the New York Central tunnel accident was a clear case of overrunning signals. At the green signal the fireman warned the engineman with no effect; and it is a fundamental principle, at the bottom of all correct signaling, that the absence of a signal is in itself a danger signal. This principle we cannot beat into the heads of our esteemed contemporaries of the daily press. They all assume that if the tunnel had been worked by electricity the collision would not have taken place. Unhappily, all of us who have been obliged, in the line of duty, to keep track of railroad accidents have had frequent occasion to know that enginemen may run by signals even in the open country, and in broad daylight. The assumption then that this accident would not have happened had the tunnel been worked by electricity is in itself false.

But we wish now to speak of another side of this question, which appears to have escaped the attention of the editors. If the tunnel had been worked by electricity, and if the collision had taken place, through the paralysis of the faculties and energies of the engineman, the result would probably have been considerably worse than it actually was. It is likely that the wreck would have been burned at once by a short circuit of the electric current. In such case few of the wounded would have escaped. The fact has been overlooked during the excitement following this accident that an electric train was burned on the 23d of last December, killing seven people. It has also been forgotten that electric cars have been repeatedly burnt to the trucks within the last two or three years. We shall not particularize now because we do not wish to be unnecessarily disagreeable.

From all this it does not follow that it is desirable that people should cease to use electricity for traction; on the contrary, there is not the slightest probability that there will be any interruption of the extension of this use of electricity. But what we want particularly to make folks think about now is the importance of taking every possible precaution against the burning of electric trains and cars. We can conceive of nothing more horrible than a train on fire in a tunnel; but a train on fire on an elevated railroad would be almost as bad. It would seem to follow that anybody equipping a tunnel or elevated road for electric trains should take every precaution known to the present state of the art to guard against fire. Obviously, the Pennsylvania Railroad people are justified in assuming that by the time their under-river tunnels are ready for trains a good deal of experience will have been had, and the electric art will have been advanced considerably beyond its present state; but others will have to begin to get their experience at once. We have not much to suggest as a measure of greater safety, but it would seem reasonable to make motor cars practically fireproof by the use of a good deal of steel in construction and by fireproofing the wood. It would seem reasonable also to make their underframes so strong as to keep them from breaking or deforming in any moderate collision. On another page will be found a letter from Mr. Westinghouse, which is of especial interest at this moment.

The Collision in Fourth Avenue Tunnel.

Were the effects of this disaster limited to the actual loss of life and the bodily injury sustained by the survivors the event would be lamentable enough. But the harm which was done did not stop there. Many thousands of other suburban passengers realize how narrowly they escape a similar fate and how great are the risks which they run daily. Nearly the same conditions which made this disaster possible they are excusable for thinking exist there continually. The bravest of men who consider their business, social and domestic responsibilities may well grow anxious when they realize how suddenly their earthly activities may come to an abrupt termination. Again, there are the families of suburban residents, who stay at home, and who are unquestionably more solicitous about fathers, husbands and brothers than the latter are about themselves. Perhaps they exaggerate the danger to which their relatives are subjected. Yet feeling constitutes an important element in life, and, whether altogether rational or not, it must be reckoned with.

Barring a little exaggeration in the third sentence, the foregoing paragraph, copied verbatim from the New York *Tribune*, gives, on the whole, a temperate statement of the attitude of the public.

The attitude of the railroad company is equally easy to define. There is no question that the New York Central aims to maintain in all respects the highest standard which may be required to insure the most perfect safety on this busy line. That the purposes and disposition of the New Haven road have been substantially in accord with those of the Central, as regards the operation of this tunnel is, we believe, equally unquestioned. That the officers of these roads have approved the expenditure of $25,000 at one time for signaling apparatus for only two miles of road shows that they have not grudged money in this matter. Whatever may be said about other railroads, or other parts of these roads, this five-mile four-track line (Mott Haven to 42d street) is one of the busiest railroads in the world, and therefore the expenditure of large sums for the protection of trains is justifiable, and the railroad officers recognize their duty in the premises. The highest practicable ideals in operation are warranted. Now, what is the ideal standard?

At the outset we would remind those New York City editors and other persons who spend so much of their time in denouncing the management of the road for not lighting or ventilating the tunnel in a proper manner, that we are not here discussing illumination or ventilation. The simple problem, as far as this collision is concerned, is, how to most effectually prevent rear collisions. Even if the presence of smoke in the tunnel be regarded as an important element in the discussion of signaling, we must bear in mind that the signaling for every railroad, in or out of a tunnel, which is traversed by numerous high-speed trains, must be made adequate for the running of trains during the densest fog. So far as signaling is concerned fog and smoke may be considered as substantially alike. Fogs occur on all railroads. They occur at the most unexpected times and sometimes they last for hours or even days. If there were no tunnel whatever in Fourth avenue the railroad would still find it necessary to so design and place its signals that a train could be run at good speed in spite of the obscuration of visual signals by the densest fog or smoke. Even on the open road a train in the opposite direction, passing on an adjoining track, may hinder an engineman from seeing his signal, and he must be prepared to deal with such an emergency at any time. In and around London thousands of passenger trains have to run in fogs of incredible density for days at a time.

The ideal railroad may be quite different from that contemplated by the legal standard. The courts require a railroad company to conform to "the state of the art" as measured by the best standards that can be found in practice; they do not always require the highest scientific refinements. A railroad company, however, may do as much better than the judicial requirements prescribe as it may see fit; and, as we have just said, there is no question about the desire of the New York Central to secure safe service.

A description of ideal signaling comes pretty near being identical with a description of the signaling in this Fourth avenue tunnel. The only feature in which these signals fall short of the most approved standards laid down by the highest signaling authorities is that the daylight signal is a disk instead of a semaphore, there being insufficient room in the narrow tunnel for a full size semaphore. (A large part of this "tunnel" is well lighted by overhead openings, so that for most of the day the signals in this part are daylight signals; though the lamps are kept

constantly lighted.) There is a home and a distant signal at each block station. These are worked by men in the cabins, and the men work, we believe, but eight hours each daily. The most elaborate electric interlocking from station to station is provided. In the efforts at extreme protection which were made after the collision of 1891 the company established two cabins at each station, one for southbound trains and one for northbound. At the same time continuous track-circuits were put in throughout the length of every block, so that the signals are at all times controlled in the same effective manner that automatic signals are controlled; every train, at every foot of its progress, is giving an indication in the cabin of its presence in that block section. To provide against the liability of having to use hand signals when the fixed signals may be out of order, a second signal (or signal indication) is provided for use in such cases.

In addition to the visual signals a torpedo magazine is fixed opposite each home signal and whenever that signal is in the "stop" position the torpedo is pushed into a position adjacent to the rail where it will be exploded by the first wheel of any engine that wrongfully passes the signal. A second automatic audible signal, consisting of a mechanical gong, was also put in at each home signal, but we believe that this was soon abandoned and an electric bell substituted. These elaborate and costly devices were fully described in the *Railroad Gazette* in 1893 (May 26, p. 387) and 1896 (Dec. 11, p. 860). There can be little question that, as far as signaling is concerned, the Central road here complies with the strictest judicial standard.

But our ideal includes, of course, something besides signals. Where trains are to be run at high speed, and closely following one another, the service demands the best locomotives, cars and brake power. There should be brakes on every wheel of every vehicle in the train, and these brakes should be kept in the highest state of efficiency. For readers of the *Railroad Gazette* we do not need to enlarge on this point.

That the track and roadbed should be first class goes without saying. Road, signals and rolling stock being satisfactory, the third element is the personnel. On the busiest railroad in the world, carrying many thousands of passengers every day, the trainmen of all classes should be of the highest grade. The ideal locomotive runner is a man about 35 years old. He has had experience on locomotives in all kinds of train work. This experience begins with firing on a freight or yard engine; then there must be several years' experience as an engineman on a freight, and then some on easy passenger trains before taking the hard ones. The runner of a fast train on a busy road like this must be perfectly familiar with the line over which he is running.

In former years this experience and this knowledge would almost be considered enough, in themselves, to qualify an engineman for the service of which we are now speaking. But to-day, when a railroad officer speaks of the ideal requirement, he means all of this; and, in addition, a good foundation; a good degree of native ability and elementary training in the man at the beginning, when he is engaged. It is no longer taken for granted that experience, alone, proves fitness. It is no longer approved practice to make a man a runner simply because he has made a satisfactory record as a fireman.

In addition to "native ability," such as can be shown by a written examination, we must include the matter of temperament. A sound body, good health, normal vision, and freedom from color blindness are requirements which we need not here emphasize. Moreover, it is probably safe to say that the question of color blindness has no bearing on the present case. Neither has the question of hours of work. Wisker was properly rested.

Temperament may almost be called the fundamental requirement, and yet it is the hardest to define and the one requiring the most care and good judgment in deciding upon. It is fundamental, in that it means the quality of the brain and nerves which are the essential elements of the man. Not even the oldest and most accomplished employing officer will trust himself to pass judgment on a man's temperament until he knows something of his record. Occasionally a fireman's appearance and behavior will show at once that he is above the average in mental and moral quality, and is fit to be promoted; often the evidence that he is below the standard is quickly seen; but usually it takes time and continued observation to find out how high a quality of work a man can be trusted to perform. Temperament includes the questions of quickness of perception, sense of duty, power to maintain mental poise when fatigued, patience under distracting or irritating circumstances, fearlessness in sudden danger, calmness in distress, and many other things. The ideal engineman is quick in his motions when quickness is necessary, yet keeps his other faculties wide awake at the same time. He can attend to a troublesome injector yet not take his mind off from the road ahead. He can converse a few seconds with the fireman or with a passenger in the cab, and yet not neglect his duties. He can increase his speed to the highest limit of safety, while still bearing in mind his duty to respond to a stop signal in a single second. He can reflect on the fact that his superior will be displeased at a loss of two minutes' time, and yet stick to the fact that far greater displeasure would follow disregard of a signal, even if such disregard should harm nobody.

The opposite of this kind of man need not be described. Every reader has mentally described it already. In actual life we are generally compelled to lump the negatives of all these qualities under the one head of dulness; dulness buttressed by lack of the sense of moral responsibility. The engineman who fails to see a signal and claims that the failure was due to the fact that he was distracted by some trouble with the machinery, usually is simply of too sluggish mind to appreciate the full importance of signals and too weak morally to realize the wrong of covering up a fault by telling a lie. From all the reports thus far available it appears that Wisker is *not* weak morally, which is a very gratifying thing to learn.

In all of the elements which we have mentioned as being required in the engineman, except skill in managing the engine itself, as a machine, the standard is of about the same kind for the fireman as for the engineman. The fireman is usually younger, both in years and in service, and therefore the standard is necessarily lower; but firemen, when engaged to enter the service, are examined with a knowledge of the fact that they are expected to become candidates for the position of engineman, and therefore in the matter of native ability, general mental training, and temperament, the candidate should be as good as an engineman.

The matter of the fireman is of particular importance in this case, as Fireman Fyler stated to the reporters that he shouted to Engineman Wisker when he passed the distant signal, which was against them. This requirement, that both of the men on an engine shall not only see a signal, but shall speak to one another about it, is an important one. It is a comparatively recent thing in American train running, but is, we believe, quite general now on the best roads. So far as we can recall, there are many more codes of rules which do not contain this requirement than there are which do; but the requirement exists in practice on some important roads where it is not found in the printed code. The earliest instance of the rule that we remember was on the Boston & Albany some 15 or 20 years ago. Not for several years afterward did we find it anywhere else. This rule is a particularly hard one to maintain in its integrity. In the present case Fyler said that he *thought* that Wisker must have heard him. The question at once arose in the mind of every observing reader, What was the communication good for if there was no assurance that it was heard or comprehended?

A moment's reflection will show why this rule is hard to enforce. It is to be borne in mind that the fireman is a subordinate of the engineman. In shouting to the engineman (nothing less than a shout will answer on a locomotive running at full speed) a fireman is in the attitude of giving advice to his superior, which is always a delicate thing to do. Readers of the *Railroad Gazette* will remember recent correspondence in which this matter has been discussed. Enginemen are common who when spoken to by the fireman will sometimes "answer with a grunt" and tell the fireman, by word or act, to attend to his own business. The writer of these lines recently took a trip of a couple of hundred miles on a fast train of an important road, in which he rode with three different engine crews; and a considerable difference was observable in the strictness with which the different firemen observed and shouted the signals, and with which the different enginemen responded to the shout.

From the foregoing paragraphs it will be seen that to tell whether or not the service in connection with a particular engine at a given time conforms to the highest ideal is by no means a simple matter. The trial which is being conducted this week by the state railroad commissioners and the District Attorney of New York County should show how nearly the practice of the New York Central in the tunnel on Jan. 8 conformed to the ideal. From such reports as have appeared in the daily newspapers, it would appear that the engineman was not qualified for his duties. He had been on this run only twice before, being a spare runner, but recently promoted. Every railroad man knows how the first few days of getting the hang of a new run will frequently induce undue anxiety in a runner who has previously been accustomed to bearing the responsibility only on slower runs. Wisker's length of service as engineman on the Harlem Division is only five months. He had, however, been through the tunnel times enough as a fireman to be well acquainted with the location of the signals. It is said that he was a runner on the West Shore road several years ago, but nothing is told as to why he left there. He is now 42 years old. He is a man of excellent personal character.

Of the immediate circumstances throwing light on Wisker's conduct, the most significant is the fact that he had run this train only three days. He was a few minutes late, and anxious—to a reasonable or unreasonable degree—to make up the lost time. Three miles back (125th street) the New Haven train was on the outside track, and Wisker doubtless saw it there. He may have failed to notice that, at Ninety-sixth street, that train was allowed to cross over to his, the inner, track and go on ahead of him. Estimating the chances of getting a clear signal at the successive blocks by the distance which the train that preceded the New Haven train was ahead of him, he very likely felt too confident that the signals would be clear. This circumstance affords no shadow of excuse for not keeping in mind just where each signal must be looked for or not being constantly prepared to slacken speed if, on coming near the place where the distant signal ought to appear, any smoke, steam or fog happened to get in his way. But it is of interest as a circumstance. Every experienced superintendent would conclude, from what is known thus far, that probably Wisker was knowingly taking chances. If any one were to assert that he is a thoroughly well qualified runner—which would mean that his error must have been an inexplicable temporary paralysis, such as sometimes makes the best organized brain go wrong—the facts that have been published would compel disbelief. Such a conclusion, when brought to the cognizance of an investigating body, like the state railroad commission, demands an inquiry covering all the questions which are suggested by the above outline of what a competent engineman should be.

A word more about torpedoes. Torpedo signals have now been maintained at the signals in the tunnel for eight years or more. They have been used much longer than that time on the Manhattan Elevated. There are, however, objections to this kind of signal. In the first place, the absence of a detonation indicates "all-right," so that if a torpedo set to indicate "stop" fails to explode it gives by its silence an indication contrary to that intended, and a positively dangerous indication. Again, a torpedo at the home signal may be useless, even when its operation is perfect. It was in this case. The engineman cannot obey a signal until he hears it. Yet the train ahead, which should be protected by the torpedo, may rightfully be standing not more than 100 ft. away. The normal place for a torpedo is at the distant signal. To put it there would be costly and troublesome, as thousands of torpedoes would be used in regular service, for a train is not required to stop at a distant signal; therefore few railroad managers have used torpedoes at fixed signals. To reverse the arrangement and have the torpedo indicate "go ahead" instead of "stop" would be still more costly. These objections do not all of them apply to a bell; but bells have never yet found much favor for this kind of service.

We do not attach much importance to the experiments conducted in the tunnel on the second day after the disaster, when, it is said, several torpedoes failed to explode, because it is settled that the torpedo did not fail to explode when Wisker passed it.

In connection with the duty of the engineman and fireman to speak to each other, it may be suggested that perhaps a bell or some other mechanical arrangement in the cab would obviate the difficulties which we have mentioned. There is no question that something of this kind could be easily and cheaply provided. To make such provision would be considered by many as an excessive refinement; but why should this be an objection? We are employing refinements in other things, why not in this? What requires more refinement of study, and of practice, than the automatic air-brake, and the process of instructing the men in its use?

Consideration of the signaling in a two-mile tunnel (the two outside tracks are constantly dark, whatever may be the condition of the inner tracks) suggests a third point—the visual signals might be put closer together. As we have already said, the signals as now arranged in the Fourth avenue tunnel

measure up to the highest standard anywhere in use. But even with this highest standard—in this tunnel or in any other; on the London Underground, or in the Hoosac tunnel, or anywhere under such conditions as prevail in tunnels—there is frequently some difficulty in "finding" the signals. Enginemen every day find themselves, as they approach the distant signal, in doubt whether they will be able to see it, and consequently they have to slacken their speed. We may remark here, in parenthesis, that the critics among suburban passengers of the New Haven and the Central roads who are so confident just now of their wisdom and judgment concerning the conditions in the tunnel, and who are so positive that an engineman cannot see the signals, should recall, from their own memories, how frequently, in passing through the tunnel, they feel or hear the brakes applied for a few seconds and then released. This experience, to a passenger who rides much through the tunnel, is the best evidence that could be asked for, and is an evidence that exists in great abundance, that the enginemen running through this tunnel not only can see the signals, but that they do see them; that when it is difficult to see a signal, or doubtful whether one will be seen in season, the experienced and competent enginemen know how to deal with the doubt or difficulty.

The most comprehensive improvement that could be made would be to have additional distant signals; or, to carry the idea to its logical conclusion, to have distant signals so near together that the engineman would not take his attention off from them for any appreciable length of time. A scheme of this kind was described in the *Railroad Gazette* in 1891, after the collision of that year (March 13, 1891, page 176) and in 1893 it was tried in the tunnel of the West Shore road at Weehawken. This arrangement consisted in a row of ordinary incandescent electric lights, strung along the side of the tunnel, at short intervals, say, 100 ft. Even at 250 ft. apart, an engineman would see a light, when running at ordinary speed, about as often as he drew his breath. A light burning indicated "all clear;" a light not burning indicated "caution"—that is to say, each light was a distant signal to indicate the condition of the track at a point a good distance ahead. This could be very readily used in connection with, and without interfering with, the ordinary manual signals. We never heard of any reason for the abandonment of these signals at Weehawken except the cost, which was deemed unwarrantable for that line.

In defining the highest approved standard of safety in signaling we have made no mention of automatic mechanical devices, in which a rod fixed near the track strikes a lever on the locomotive and sounds a whistle or applies the air-brakes. The main objection to this is that it is useful only for trains with locomotives specially fitted. Railroad managers do not deem it safe, certainly not wise, to thus bind themselves never to run a train over the road with an engine from another road. It is proper to say, though, that one important English railroad has been using a thing of this kind on one division for some months.

Neither have we mentioned derailing switches, with which an engineman disregarding a stop signal finds his engine, himself, and probably two or three cars, in the ditch. This device is used at most drawbridges and at many grade crossings. With it there would be considerable risk of derailing a train in the tunnel under circumstances in which it would be safer to let it go on. At grade crossings a train is occasionally ditched by a derailer, causing much damage, when the train on the transverse track has succeeded in stopping short or in passing beyond the crossing.

But the "moral safeguard" feature of the derail is an important element of its usefulness, and this would not be without value in the Fourth avenue tunnel. As a physical safeguard it causes damage now and then. As a moral safeguard it makes enginemen more careful. Knowing of its existence their vigilance seems to be subject to fewer lapses. Now, on this same line, two miles north of the tunnel, at the Harlem River drawbridge, a moral safeguard has been maintained for many years in the shape of a signal which, if disobeyed, smashes the headlight or the smokestack or the cab window, or all three. This could, no doubt, be made available in the tunnel. It is perhaps not very clear why an engineman should have any more dread in going before the superintendent with a broken smokestack than he would simply to confront a signalman who had reported him as disobeying a signal, especially where the signalman has a broken seal or other tangible evidence of the truth of his charge; but the increased dread does seem to be a fact. The last we knew, this moral signal at the Harlem River had not been touched by a locomotive for 20 years or more—in fact, never.

Still, one cannot lightly set aside as inadequate any system of signaling, so extensive as this one, which has done such exacting service for 11 years without a collision. In that time probably about two million trains have passed through this tunnel, on the four tracks; which means twenty million signal operations (or forty million, if a home and a distant be counted as two). With such a record, we are compelled to believe that competent enginemen can run with safety by the guidance of these signals. This means that the most important points that the public should ask the railroad commission to throw light upon are those connected with the temperament, education, record and experience of Engineman Wisker, and the circumstances of his selection; the record of the fireman in similar manner; and the degree of success which the company has experienced in the maintenance and enforcement of the rule requiring enginemen and firemen to "shout" the signals to each other.

The directors of the New York Central, at the close of a meeting held last Wednesday, announced the outlines of a plan for making a loop station beneath the present terminal station at Forty-second street, the adoption of electric traction for suburban trains on the outside tracks through the tunnel, and the enlargement of the yard. At the same meeting the directors voted to increase the capital stock of the company from 115 millions to 150 millions. They say that the company is prepared to proceed with the work, on the plan outlined, as soon as the necessary legislation can be obtained. The statement begins by saying that the directors deplore the accident of Jan. 8 and deeply sympathize with the sufferers and their families. The tunnel was built by a board of four engineers, appointed under a special law, of whom only one was connected with the railroad company. Signal changes and other improvements have been made under the advice of experienced officials. Whatever the motive power, and wherever the line may be, the system of signals and the regulations must be substantially the same. The company would prefer to change the tunnel into an open cut, but this has been opposed, and is thus far impossible. Therefore the loop for suburban trains was decided to be the best practicable remedy. It is proposed to equip the line through the side tunnels with the most modern appliances for underground traction. (Nothing is said as to how far out the electric line will extend.) Through trains, drawn by steam engines, will continue to be run through the center tunnel. The loop will nearly double the capacity of the station. The electrical work is spoken of as experimental; until its success is demonstrated the directors do not deem it wise to think of abandoning steam locomotives for the through trains. The Legislature and the city will have to give authority to change motive power and to take additional land for the purpose of widening the yard between Forty-sixth and Fifty-sixth streets. This "somewhat premature announcement" may make it harder, they say, to secure the necessary land; but some land has already been bought.

It appears that the railroads in "central" territory—west of Buffalo and Pittsburgh, and east of Chicago and St. Louis—have weakened in their resolution to abolish exchange passes and the report is common that traveling freight and passenger agents will soon have about the same transportation that they had last year. President Ingalls, of the Cleveland, Cincinnati, Chicago & St. Louis, is quoted as saying that he expects to issue exchange passes, but not nearly so many as heretofore, probably not over 40 per cent. of the former number. Passes will be given wherever it seems to the interest of the road to do so. As for himself and the general officers, they expect, he says, to pay their fares when traveling over lines other than their own. The report that President Truesdale, of the Lackawanna, was the most aggressive president in abolishing exchange passes on the eastern roads, and as such was having his road boycotted by agents of the Chicago lines, is denied with emphasis by Trunk line officials.

NEW PUBLICATIONS.

Electrical Catechism. By George D. Shepardson, Professor of Electrical Engineering in the University of Minnesota. Large 8vo., 390 pages; diagrams; index. New York: American Electrician Co. $2.00.

Although the author, in his preface, speaks of his work as being intended for artisans or students in electricity, yet his treatment of the general subject is so thorough that any engineer seeking a general, rather than a special, knowledge of electricity may be benefited by its reading. Being in the form of a catechism, no opportunity for asking and answering questions has been lost, and the reader has little to ask other than what is found in the book. Both static and dynamic electricity are considered in their applications, scientific, medical and industrial. The last chapter is on alternating currents, and gives a clear idea of that somewhat complex subject without involving anything more than elementary mathematics. There are over 300 illustrations which are generally helpful, but as many of them were borrowed from trade literature (as acknowledged in the preface) there is little uniformity in their style, and some of them are so much reduced that a magnifying glass must be used to read reference letters and dimensions. The type is of good size and the presswork clean; but the margins are unnecessarily wide, and the book somewhat cumbrous to handle, which seems a pity in view of the general demand that technical books shall be as compact as possible.

Production et distribution de l'energie pour la traction électrique. Par Henry Martin. Paris: Ch. Béranger. 1902; 749 pages; 8 vo., with 870 figures.

In this work the author has treated the stationary installations which have to do with electric traction, namely, the plant for generating the current, the lines for its distribution, the appliances for its delivery to the motors of the moving carriages, and the arrangements for its return to the generating station. There are many good treatises on electric traction, but most of them are devoted mainly to car equipment and the present treatise has good reason to be. It is encyclopedic, more especially in regard to distribution and delivery systems and appliances, and it is on the whole an excellent and a valuable book.

TRADE CATALOGUES.

Hoisting Machinery.—The C. W. Hunt Co., West New Brighton, Staten Island, N. Y., send two pamphlets, one describing electrical hoists and the other describing steam hoisting engines. In each case there are numerous illustrations of machines, their parts, and actual applications, together with descriptions and price lists.

The Standard Railway Equipment Co., St. Louis, Mo., has issued a catalogue of its "Monarch" pneumatic tools. These are shown by engravings as used on different classes of work, and also the pieces of each tool are shown separately and marked with the numbers to be used in ordering repair parts. The tools shown include Monarch chipping and riveting hammers, pneumatic holder-on, flue cutters, piston air drills, wood-boring machines, special sets of wood bits, air hoists, air compressors, hose, hose coupling and small supplies.

Hose Couplings and Fittings.—The W. J. Clark Co., Salem, Ohio, have sent out a catalogue illustrating and describing their "Quick as a Wink" hose coupling and other specialties for water, gas, and air hose connections. There are also illustrations showing how fittings are attached to hose, and how nozzle and coupling are applied by a simple snap-ring that works literally as "quick as a wink." It looks like a secure attachment that should take a deserved place among such fixtures. The catalogue can be had by request to the manufacturers.

The Vulcan Iron Works Co., Toledo, Ohio, has issued, as an advertisement of its steam shovels, elevators and dredges a convenient little vest-pocket diary and book of useful information. In addition to the data usually put in such a book there is a summary of the results of the last census, giving the population of the several states, dependencies and principal cities; information as to postal rates and internal revenues; maps of all the territory controlled by this country and tables of weights and measures and similar data. There are also several illustrations of the machines built by the Vulcan Iron Works Co.

The Watson-Stillman Company, 204-210 E. Forty-third street, City (The Rookery, Chicago), send to us catalogue No. 63, being a pamphlet devoted especially to hydraulic valves. This is a special selection of sheets, describing hydraulic tools; and the pamphlet contains an index, up to November, of illustrated sheets, many of which are not found collected in this pamphlet. Of course, the variety of valves and fittings is considerable and they are adequately illustrated and described with special index for this collection.

The Renold Driving Chain.—The Link-Belt Engineering Company, Nicetown, Philadelphia, Pa. (49 Dey street, New York; Park Building, Pittsburgh; and Link-Belt Machinery Company, Chicago), send a little pamphlet describing the Renold high-speed style driving chains. This beautiful contrivance for transmitting power was the subject of an interesting paper at the last meeting of the American Society of Mechanical Engineers; and it was described briefly in the *Railroad Gazette*, Dec. 13, page 858. The engineer who has never seen it will do well to send for the pamphlet, for unquestionably this new chain is destined to very much increase the uses of chain drive, extending the range of its application not only as to power transmitted, but as to speed.

Flexible Metallic Tubing.—The American Metal Hose Co., 40 Dearborn street, Chicago, sends its latest circular on flexible metallic tubing. Sectional views show how this tubing is made. In general there is an inner coiled tape of copper surrounded by an outer coiled steel tape. The tape is rolled up in the form of a spiral, so that the edges overlap. Single tubing is also made for use where it is not twisted or subjected to rough usage, but where the tubing is much handled, the double hose is recommended. It is said that this hose is impervious to steam, hot water, oils, tar, fats, lye, acid, ammonia and gas. It can be made to withstand a pressure of 3,000 lbs. per sq. in. This metallic hose has been adopted by

the Imperial German Navy and the North German Lloyd Steamship Co. for use on its ships, and it is largely used on the Liverpool docks for conveying steam to grain elevators. In shops it is adapted to such purposes as rubber hose is used for. The circular names a large variety of uses to which this tubing is being put. The tubing is made according to the Witzemann system.

Radial Drills.—The Bickford Drill & Tool Co., Cincinnati, Ohio, has published a booklet called Fifty-Six Points of Vantage, dealing with their new line of radial drills. The general design of drilling machinery as well as the proper speeds and feeds of tools used are ably discussed. This booklet can be had upon application to the Bickford Co.

Ohio Railroad Commissioner's Report.

J. C. Morris, State Railroad Commissioner, has filed with the Governor his report of the railroads in Ohio for the year ending Nov. 15, 1901. It contains a chronological history of the Ohio railroad corporations from 1830 to the present.

Forty-four complaints of dangerous highway and street crossings were investigated, and orders issued thereon. Seventeen interlocking plants were constructed or reconstructed and orders issued granting permission to operate them. Three hundred and forty-five orders were issued approving plans for stringing wires over railroad tracks. Thirty-nine orders were issued directing the installation of safety devices at grade crossings of the tracks of electric railroads with the tracks of steam railroads. Four orders were issued approving the construction of overhead structures over railroad tracks.

The length of railroad in the State is 8,976.04 miles, an increase over 1900 of 24.75 miles. Second, third, and fourth tracks aggregated 1,045.25 miles, an increase over 1900 of 219.58 miles; sidings, 3,881.69 miles, an increase over 1900 of 219.58 miles.

The taxes paid in Ohio were $2,642,400.79; 1900, $2,556,946.64; increase, $85,554.15, or 3.37 per cent.; excise taxes paid on gross earnings in Ohio, $448,496.39; in 1900, $430,245.59. Total taxes per mile, $354.47; in 1900, $343.67; an increase of $10.80 per mile, or 3.14 per cent.

The number of employees in the State was 66,249. Number injured resulting in death 176, or one in every 376 employed. The number of employees injured not resulting in death was 5,589, or one in every 12 employed. Total number of persons injured was 6,978, a decrease of 807, or 10.36 per cent. for the year, distributed as follows: Passengers killed, 7; injured, 304. Travelers on highway killed, 82; injured, 160. Employees killed, 176; injured, 5,513. Trespassers killed, 342; injured, 394. Total killed, 607; injured, 6,371.

The total number of bridges was 3,983; a decrease of 65. Aggregate length of all bridges in Ohio, 272,711 ft., or 51.65 miles. The number of trestles in the State was 4,432; a decrease of 190. The aggregate length was 429,425 ft., or 81.33 miles; an increase of 31,089 ft., or 5.89 miles. The number of tunnels in the State was 55, an increase of three. Aggregate length of same 40,254 ft., or 7.62 miles.

The first electric railroad was "The Soldiers' Home Electric Railroad Company," July, 1889, at Dayton.

During the fiscal year ending Nov. 15, 1901, 96 electric railroad companies were incorporated, with a total capital stock of $24,361,000. After numerous reorganizations and consolidations there were, on May 1, 68 companies operating electric railroads within Ohio. These 68 companies operate a total of 1,818.16 miles of line, an amount equal to about one-fifth of the main track mileage of all the steam railroads of the State.

In the year 1900 the electric railroads of Ohio reported total gross earnings of $11,301,172; for 1901, $13,582,851, an increase of $2,281,479, or 20.18 per cent.

The Responsibilities of the Educated Engineer.

The Commencement Day address at Purdue University, last June, was delivered by Mr. George S. Morison, and it has been published by the University in the form of a pamphlet. The address is very broad and philosophical in outlook and treatment and is well worth the reading by anybody. We can take space here to print only a few extracts from it, selecting such as have the most immediate bearing on the future work of the educated young engineer now coming into the field.

Your work, however, may not be confined to what is commonly understood as engineering. Many a man beginning as an engineer graduates from that profession and goes into other work in which the advantages of a technical training never cease to be felt. The management of corporations and many branches of Government work are of this kind.

The great corporation is a modern development which many people fear. It has become so great that its powers are thought to threaten the freedom of personal independence and to endanger the purity of governments. These are real dangers, but the great corporation exists and modern civilization cannot do without it. . . . You can be called to no higher duty than such management; you can assume no greater responsibilities.

Large aggregations of capital have become necessary. In no other way can the tools and appliances necessary to develop economical results be obtained. This aggregation of capital means one of two things; it means either the concentration of great wealth in the hands of individuals or it means the collection of the wealth of many in great corporations. The two are gradually becoming combined; individual manufacturers are availing themselves of legal provisions to place their affairs under the protection of corporate ownership; there is nothing to prevent the concentration of the greater part of the stock of a corporation in the hands of a few men or even a single individual. This tendency results in a concentration of control and management, rather than in a real unity of ownership. However great the wealth of individuals and the amount of property concentrated in a few hands, the wealth of these individuals may be much less in the aggregate than the savings and small capital of the people of small or moderate means, and when these people are working for wages, as nearly all of them are, they have no use for their savings or small capital. This small capital, though the owner may not understand what really becomes of it, is used by the corporations and by the wealthy men who are carrying on the great manufacturing, transportation and other active works of the country. The capital of the nominal owners and the nominal capital of corporations is generally very much less than is required to conduct their business. The other money is borrowed; borrowed from small investors, from savings banks and from other financial institutions; borrowed at rates of interest which are low in proportion as the security is large. All this borrowed money has a claim on the capital of the corporation and on the wealth of the individual manufacturer before any profits can be distributed. The apparent owners may take the larger profits but they assume the risks; the ultimate ownership is with the owners of the borrowed money, who must always be protected, even at the entire loss of every other interest. . . .

The most successful transportation line will not be the one whose agents are most active in securing business, but the one which is the most closely handled, which can carry its freight at a less cost to itself than any competing line. . . . As these tools become larger and the demands upon them greater, the responsibility and honor which belongs to the successful management of such interests will be more fully recognized. . . .

The old rule of equity, that any one handling the property of another is a trustee and has no right to use that property for his own benefit, is fundamental and must always govern the management of corporations. In a corporation there are three elements at work: ownership, employees, management. . . . The manager is the trustee for both parties; he must understand the tools that he uses and get the best work out of them that he can for the owners; he must understand the relations between those tools and the men that work them and see that the workmen are competent and cared for. The rights of ownership are the rights of property which are the foundation of all civilized governments: the manager is the trustee for this ownership. The rights of the employees are the rights of men and women who are profiting and must be allowed to profit by the developments which the modern tool has rendered possible, and to whom the increased leisure and comfort which the substitution of mechanical power has given us, must ultimately accrue. The owners and workers both have rights; the managers have principally responsibilities. . .

I once knew a man, of singularly attractive personality, who, beginning as a civil engineer, nominally gave up that profession but really passed into one of the higher ranks of which it is capable and became a railroad superintendent and ultimately the president of a great railroad system. Throughout his career he retained the gentleness of his youth and the enthusiasm of his early manhood. In speaking of professional work and what I myself was doing, which was in the nature of general practice, he said that it lacked the satisfaction which belonged to watching and directing the development of a single great property. Like the emancipated slaves in the old Greek army, who being without a country, adopted valor and courage for their fatherland, so he, a childless man, adopted his work and loved it. He was not working for his salary but in the satisfaction of seeing the great interests which were intrusted to him, develop and expand. It was the true spirit which should actuate the engineer, the kindly noble spirit which can make a great corporation a blessing to the community which it serves. . . .

At present the obstacles to the unification of the human race are great; they are an inheritance from the past which the engineer must gradually obliterate. The mental and intellectual obstacles will be much more difficult to surmount than the purely physical obstacles, but if they ever are surmounted the conquest will be complete, while the mountains and oceans will continue lines of past demarkation overcome by the work of the engineer, but still remaining to help understand the history of the ages which are just entering their final period.

It is unwise to predict too much, but we may be sure that the effect of time will be to reduce greatly the number of nations in the world; that these nations will ultimately be large but compact, perhaps not more than a dozen in all; that the duties and responsibilities of government will increase and that there will be great changes in the forms of government. The world has been ruled successively by the soldier, the priest and the lawyer. Prowess and statecraft have governed and often governed well. We look to a government of the people by the people, in which the governed are not the subjects of the governors, but the governors are the servants of the governed. Such a government will for the present need the soldier; for many centuries it will need the jurist; it will always need in many of its most responsible positions, the man, who whether he be called an engineer or by some other name, is devoting his skill and energy to bettering the conditions of his fellow-citizens by directing and controlling the great powers with which nature has surrounded them for the use and convenience of the people whose servant he is. . . .

We need the generosity of the true engineer; we need the integrity of the trustee; we need the self-sacrifice of the patriot. The only thing which can protect us against the dangers of our wealth, is a spirit which appreciates the responsibilities which you assume as members of a family, as members of a community, as citizens of the State which has educated you, as citizens of the country which has made this education possible.

TECHNICAL.

Manufacturing and Business.

The Lappin Brake Shoe Co., of Bloomfield, N. J., expect to have a shop in Buffalo, N. Y., ready by March 1, in charge of R. B. Coleman.

F. M. Pease, Chicago, has finished new locomotive and car shops and will be getting out considerable shipments of locomotives and cars from now on.

The American Foundry Co. has been incorporated under the laws of New Jersey, with $10,000 capital, which will later be increased to consolidate several of the brakeshoe plants.

Dilworth, Porter & Co., Pittsburgh, have let contracts to McClintic-Marshall Construction Co. for the three steel buildings for their new plant to replace those destroyed by fire some months ago.

The contract for the new power station near Tribes Hill, N. F., for the Fonda, Johnstown & Gloversville, has been awarded to the American Bridge Co., of New York, for $115,000, according to plans and specifications drawn by Charles H. Ledlie, of the Rialto Building, St. Louis, Mo. J. N. Shannahan, Engineer.

The Fargo Bridge & Iron Co., Fargo, N. D., has recently been incorporated by F. E. Dibley, John D. Benton, D. B. Holt and H. W. Geary, with authorized capital of $50,000. The new corporation has bought the works of Dibley & Robinson, bridge contractors of Fargo, and the company proposes to enlarge the works. F. E. Dibley is President; R. H. Coshun, Secretary.

Since the reorganization of the Chicago Pneumatic Tool Co., whereby they acquired the plants of the New York and the Franklin Air Compressor Companies they are devoting special attention to this branch, and report the outlook very encouraging. Among recent orders may be mentioned one for seven 500-ft. air compressors received from the Lehigh Valley Railroad.

The Canada Switch & Spring Co., Montreal, Que., has recently finished the work of extending its steel foundry about 100 ft., and has added an additional electric crane of large capacity. In the melting department one 18-ton open-hearth furnace has been added and also a large addition made to the machine shop and spring department. This completes the improvements for the present.

Harrisburg Foundry & Machine Co., of Harrisburg, Pa., inform us that they have broken ground for a new pattern shop and pattern storage building which will be 160 x 50 ft. Their pattern shop is now in the main building and the machinery will be removed to the new building and the space will be used for erecting large engines of the 4-valve type, the demand for which is steadily increasing. All contracts have been awarded for machinery for the new pattern shop.

We have before now described the Union Railroad Bridge, at Pittsburgh, designed for carrying molten metal and raw material. Naturally, this bridge is subjected to extraordinary conditions, namely, the heat of the molten metal, the fumes from locomotives and river steamers and adjoining furnaces and mills, and also the very heavy tonnage. We are told by the Joseph Dixon Crucible Company that Mr. Emil Swenson, designer and engineer of the bridge, and Wm. H. Smith, Chief Engineer of the Carnegie Steel Company, have selected to cover this structure with Dixon's Silica-Graphite Paint.

W. H. Tew, formerly connected with the American Locomotive Co., Brooks Works, Dunkirk, N. Y., and later with the Mechanical Engineering department of the Chicago & North Western Railroad, has been appointed Managing Director of the newly organized German branch of the Standard Pneumatic Tool Company, with headquarters at Klosterstr. 13-15a, Berlin, Germany, in which country will be built works for the manufacture of "Little Giant" pneumatic tools and appliances. The company is buying machinery for the plant, which will be completed before long. The export business of the company in December, 1901, was 100 per cent. greater than the corresponding month of 1900.

Iron and Steel.

The Donerman Rivet & Bolt Mfg. Co., of Pittsburgh, Pa., has recently been incorporated in that State.

W. A. Barrows, Jr., has been appointed General Manager of the three blast furnaces at Sharpsville owned by the Shenango Furnace Co., of Pittsburgh.

Moritz Lassig, founder of the Lassig Bridge & Iron

Works, of Chicago, is dead. He was born in Saxony in 1831 and came to Chicago about 20 years later.

According to the *Canadian Engineer* a concrete and iron bridge has been built in Huntley Township, near Ottawa, which is the first of the kind in Canada.

The Griffin Wheel Co., of Chicago, operating branch works at South Tacoma, Wash., is preparing to re-open the gray castings department of its foundry in that city.

Despatches from Pittsburgh state that Christopher Zug, an old iron and steel maker and founder of the house of Zug & Painter, died in that city, Jan. 13, aged 94.

The Rochester Bridge & Construction Co., Rochester, N. Y., will soon acquire a plant in New York State to make their own bridge material, which at present is being done at Pittsburgh.

The Hunt Foundry & Machine Co. has been incorporated with a $100,000 capital in New Jersey, by H. E. Hunt, George H. Clapp and M. J. Dair. The company has its office at 419 Market street, Camden, N. J.

The Alan Wood, Iron & Steel Company has started work on its new $1,000,000 basic open-hearth steel plant. The plant will be located at Ivy Rock, between Conshohocken and Norristown in the Schuylkill Valley. Five 50-ton furnaces will be built, having 100,000 tons annual capacity.

A. L. Hamerberg, of the Tennessee Coal, Iron & Railroad Co., Ensley, Ala., has been appointed Chief Mechanical Engineer of the Youngstown Iron, Sheet & Tube Co., Youngstown, Ohio. He was formerly with the Duquesne Works, and later with the Wellman-Seaver Co., Cleveland.

According to Pittsburgh report 100,000 tons of Bessemer pig iron were sold on Jan. 14 by the Bessemer Furnace Association to the United States Steel Corporation at a price said to be $15.75 per ton at the merchant furnaces, or $16.50 delivered at the various mills of the trust in the Pittsburgh district.

The Golden Gate Steel & Iron Co. has been incorporated in New Jersey, with a capital stock of $125,000. It is understood that the company will build a steel and iron plant in California. The incorporators are Robert L. Smith, 71 Broadway, New York; Edward C. McDowell, Nashville, Tenn.; and K. K. McLaren, of Jersey City, N. J.

New enterprises to be undertaken by Japan during 1902 are reported to include the building of works to make steel and iron plate at Kure; the building of army barracks in Formosa at a cost of about $1,150,000, and the extension of the Government railroads to the docks at Kobe and Yokohama which, it is estimated, will cost about $1,000,000.

The Coronet Steel Co. has filed articles of incorporation in New Jersey, with a capital stock of $2,500,000, of which $100,000 is preferred stock. It is said that the company controls patents to make basic hearth steel under a new process. The directors are: H. R. Payne, Chas. H. Blair, of New York; Oliver H. P. Cornell, of Brooklyn, and John S. Cooke, formerly of the Cooke Locomotive Works, Paterson, N. J.

A Bridge in the Arctic Zone.

The northernmost railroad bridge in the world will be on the line across Northern Norway from the sea to the great iron mines near Lulea in Sweden, near the sixty-eighth parallel, where it crosses a fiord. The material for this bridge, supplied by a Nuremburg firm, is now being delivered by the light of the stars and the northern lights; for the night lasts nearly two months. The bridge will be 590 ft. long on 10 piers nearly 100 ft. high. It will be erected chiefly next summer by 50 days of uninterrupted sunlight. The whole road is to be open by the end of 1902, and by all accounts it is likely to afford an immense supply of very high-grade ore. The latest American appliances for loading and unloading are to be provided, the harbor, though so far north, is open through the winter, and the route by sea to the blast furnaces of England, Belgium and Germany is direct and should afford very cheap transportation.

A By-product of Acetylene Gas.

In Bavaria the lime residuum left from the carbide used in producing acetylene gas for car lighting is pressed into cakes and used in purifying feed-water for locomotives. In Munich nearly three tons of residuum is left daily.

General Manifold Company.

C. B. Holdredge has been appointed General Manager of the General Manifold Co., of Franklin, Pa. Mr. Holdredge was at one time identified with the Simmons Hardware Co. and, later, with Hibbard, Spencer, Bartlett & Co., of Chicago, resigning the latter position to go with the General Manifold Co. It will be recalled that the company makes printed forms of every description where it is desirable to duplicate or manifold an original entry. Special attention is given to the numerous blanks required in railroad work and special machines have been installed for turning these out in great quantities. The method of carbonizing is the invention of F. W. Weeks, formerly trainmaster of the Mexican National Railroad, on which patents have been obtained. By this system no independent carbon sheets are used. A description of the plant was given in our issue of Nov. 1, 1901, pages 754 and 755. General Charles Miller is President of the company.

Traction Vehicles for Military Purposes.

The British Embassy, at Washington, authorizes us to say that in the spring of 1903 there will be an open competition for "military tractors," with a view to finding the best that can be adopted for the service of the British Army. Makers of such vehicles in the United States are asked to take part in the competition. Any information that is desired can be had by addressing the Military Attaché at the British Embassy in Washington.

New Pintsch Gas Plants.

The Pintsch Gas Co., of New York, has shipped the necessary apparatus to El Paso, Texas, to establish a plant to make Pintsch gas in that city. The company has recently finished plants in Mexico City, Mexico; San Antonio, Texas, and at Moncton, New Brunswick.

A Signaling Expert in the Tunnel Collision Case.

The State Railroad Commissioners of New York and the District Attorney of New York County have retained Mr. John T. Cade, of the Standard Signal Company, Troy, N. Y., as expert adviser to the Board and to the District Attorney in the investigation of the signaling in the Fourth Avenue Tunnel, New York City, where occurred the disastrous rear collision of January 8th. Mr. Cade needs no introduction to the readers of the *Railroad Gazette*, his long career in the signaling field being a matter of familiar knowledge throughout the country. It is gratifying to see this judicious action on the part of the public authorities. We may remark also in passing that District Attorney Jerome seems to have pursued a very sensible course throughout the investigation which he has made preliminary to the presentation of his case before the Coroner. The Railroad Commissioners, in securing the best talent for a work of this kind are following the excellent example which has been set by the Railroad Commissioners of Massachusetts, whose reports on accidents and other technical subjects on a number of occasions have been of marked value.

Illumination of the Fourth Avenue Tunnel.

The newspapers reported on Saturday last that the New York Central had given an order to the New York Edison Company to supply electric current for a large number of arc lights in the Fourth Avenue Tunnel, New York.

The Pennsylvania's Under-River Tunnels.

The Pennsylvania Railroad Company has appointed a Commission of five to pass on the designs and plans for the tunnels under the Hudson River, the East River and New York City. Chief Engineers have been appointed for each of the great divisions of the work. We cannot now make public the names of any of those appointed, but they are some of the best men in the country, and there is no doubt that the project will be pushed with energy.

Two Motormen on the Bridge.

The newspapers tell us that the Bridge Commissioner, Mr. Lindenthal, has ordered the Brooklyn Rapid Transit Company to put two motormen on every train crossing the Brooklyn Bridge during the rush hours. This is, of course, a measure of security and the reader will understand that the same arrangement is almost certain to be imposed on the Manhattan Elevated by the public sooner or later. It has always seemed to us that the companies were deluding themselves in supposing that they could reduce expenses by having one man instead of two at the head of the train. We say this without endorsing the wisdom of the policy of carrying two men there.

The Hankow-Canton Railroad.

It may be remembered that a few years ago Mr. William Barclay Parsons went to China in the interest of what was then known as the Bryce Syndicate, holding a concession for a railroad from Hankow to Canton. Mr. Parsons's remarkable achievement in crossing the closed Province of Hu-nan, with his survey, is still fresh in the memory. We are informed now that the work of building that railroad is likely to be taken up very promptly by the American China Development Company. The largest interest in this company is held by Belgians, but the active control is in America, and Mr. Parsons has been elected President of the company.

Big Mileage of Pennsylvania Locomotive No. 611.

Locomotive No. 611, Class D-16-C, on fast express work between Philadelphia and Jersey City, has made big mileage without overhauling. The locomotive was built at the Altoona shops and has been in this service continually since April 15, 1899. The mileage record to the end of December, 1901, is as follows:

April 15, 1899 to Dec. 31, 1899	72,918
Jan. 1 to Dec. 31, 1900	105,335
Jan. 1 to Dec. 31, 1901	107,620
Total	285,873

The engine is still in service and it is expected that at least 300,000 miles total will be run before it is sent to the shops. If this record for such work has been equaled the fact has not been published.

A San Francisco Tunnel.

A bill was introduced in the House of Representatives on Jan. 6 authorizing the building of a tunnel under San Francisco Bay to connect Oakland and San Francisco to accommodate freight and passenger traffic.

The Central London Railroad.

The Central London Railroad is doubtless known to our readers as the deep tube road, running from Shepherd's Bush to St. Paul's, right along the central axis of London. It is popularly known as the Twopenny Tube. This company now has an important plan on hand for extending this road and completing the circuit. That is, a return line is to be built south of the existing line and approximately parallel with it and nearer to the Thames. This new line would pass by Knightsbridge, Hyde Park Corner, Charing Cross, the Strand and Fleet street, and so around to the Liverpool street station of the Great Eastern, and eventually connect with the eastern end of the existing line. This line as it now stands is six miles long. The line if completed as projected would be fourteen miles, and would give an inner circle inside of the inner circle of the old Underground. It is obvious to anybody who knows anything about the geography of London that this would be an important addition to the lines of travel in that great city. We should suppose that it might be almost the best of the tunnel enterprises now projected there.

The City of London will probably build a short municipal railroad in a shallow tunnel, closely following the style of the Rapid Transit Railroad in New York. The necessary parliamentary powers will soon be sought and it is probable that the authorities of the City will ask Mr. Parsons to help them before the Parliamentary Committee in securing these powers.

The National Bridge Co.

The National Bridge Company, which was incorporated under the laws of Pennsylvania recently, and which is a part of the National Bridge Company, of 45 Broadway, New York, is preparing to build a large plant in the Pittsburgh district to make bridges and structural material. E. M. Scofield, 331 Fourth avenue, Pittsburgh, is the Manager.

For Longer Bridge Spans Over the Ohio.

For some time the rivermen along the Ohio River have been agitating for the removal of the center piers of several of the birdges over that river. It is now reported that a bill has been introduced in the House of Representatives providing for the reconstruction of bridges and for the Government to defray part of the expense. The bill provides that the bridge between Benwood and Bellaire shall be rebuilt with one main channel span not less than 589 ft.; the bridge between Parkersburg and Belpre, Ohio, to be rebuilt with a single span of 698 ft. in place of two spans of 349 ft. each. The bill further provides that the Government shall not pay more than $387,525 toward the Parkersburg bridge and $253,486 toward the Bellaire bridge.

For a Pacific Cable.

The House Committee on Interstate and Foreign Commerce on Jan. 10 took up the question of laying a Pacific cable. There are two propositions before the Committee, one providing for the laying of the cable by the Government, and the other that it shall be built by private parties under Government supervision and subsequent control. Geo. F. Ward, representing the Commercial Cable Co., explained to the committee that his company was prepared to lay a cable to the Philippines by way of the Hawaiian Islands, and in fact had already begun work. The company has a contract with the India Rubber, Gutta Percha & Telegraph Works Co., by which that company agrees to make and lay a submarine cable between San Francisco and Honolulu on or before Nov. 1, 1902. There has already been paid $182,685 on this contract. The cable is now being made at the rate of 240 miles a month, and this rate will soon be increased to over 630 miles per month. After the cable reaches Honolulu, the company intends to at once begin work on laying a cable from Honolulu to Manila, and expects to have it finished within two years. The cable from San Francisco to Honolulu would be worked at a loss without the extension inasmuch as the cable business between these two points would not be sufficient to pay operating expenses. Mr. Ward declared that an agreement would be made by his company to carry messages for the public between San Francisco, Manila, China and Japan at the rate of $1.00 a word, and that the Government would be permitted to fix its own rates.

THE SCRAP HEAP.

Notes.

The New Union Passenger Station at Columbia, S. C., was put into service on Jan. 14. All trains entering the city use this station except those of the Seaboard Air Line.

Mr. J. J. Donovan, General Superintendent of the Bellingham Bay & British Columbia, has issued a bulletin thanking the officers and employees of the road for faithful and efficient service during the year just closed. Certain conductors and others receive special mention for displaying courage and good judgment in emergencies, and each was granted a 10-days' leave with full pay.

The Railroad Commissioners of Minnesota have ordered the Northern Pacific to re-open the passenger station at Twentieth avenue, Duluth, which was abandoned shortly after the road, the St. Paul & Duluth, was bought by the Northern Pacific. The purchase of this road by the Northern Pacific was opposed by the commissioners and they began judicial proceedings to prevent it, but finally compromised with the railroad company and withdrew the objection. The compromise stipulated that the accommodations furnished the public at Duluth should never be less adequate than they then were. A very short time afterward the route of passenger trains entering the city was changed so that they did not go near the station in question; and in May, 1901, the station was entirely abandoned. The present order directs the road to comply with it within 20 days.

Railroad Bridge at Washington, D. C.

Col. Bingham, the engineer officer in charge of Public Buildings and Grounds at Washington, D. C., has made

a report to the War Department, on the effect of the approaches to the Pennsylvania Railroad and highway bridges across the Potomac River, on the proposed improvements of Potomac Park, the approaches to the railroad bridge not having been approved by the Secretary of War. The report says that if these improvements are to be carried out, the plans for the proposed embankment approaches to the bridges will have to be changed, so that instead of the common 40-ft. culverts under the embankments as proposed in the railroad company's plans, much wider passages under the embankments must be provided for, and the embankments themselves should be reasonably ornamental in character. Col. Bingham therefore recommends that the present plans of the railroad company for the construction of the approaches to the bridge be not approved, and that the company be required to submit plans which will provide for such changes as will meet the requirements of the park, the changes suggested as necessary on the part of the railroad by the report not being of exceptional expense. The report also says that the two bridges proposed should be built side by side; also, that it has been thought uncalled for to discuss in the report the extreme plainness of the proposed railroad bridge itself.

Imprisonment for an Accident.

A locomotive engineer who ran the Basel-Berlin express train into a harbor alongside a station has been tried for negligence resulting in the killing of three men, and condemned to three months' imprisonment.

Railroad Automobiles.

The Austrian State Railroads have ordered two railroad automobiles to run on lines where travel is light. Each is to carry 80 passengers. One is to be run either by electricity or naphtha, the other by naphtha alone.

Railroads in Sumatra and Java.

The Dutch Government has built one system of 3-ft. gage railroads on the east side of the island of Java, and another on the west side, which are connected only by an older standard-gage railroad, 34 miles long, owned by a corporation, on which a third rail has been laid to permit interchanges between the two systems, which, together, measure 912 miles. On the island of Sumatra the first railroad was begun in 1891, from Port Emma to important coal mines at Lounto. This road, with a branch, is 134 miles long, and overcomes an elevation of 2,550 ft. on the main line, and of 3,774 ft. on the branch. Part of the line is worked with cog-wheel engines. The Sumatra road carried 290,000 tons of freight, besides 198,000 tons of coal as early as 1898. The Java lines have a very flourishing traffic.

International Sleeping Car Company.

The International Sleeping Car Co., whose financial embarrassment we have noted heretofore, is to be relieved by a process almost equivalent to a reorganization of a bankrupt company here. The holders of the 50,000,000 francs of stock are to exchange it for 35,000,000 of new stock; and new capital to meet the company's engagements is to be provided by an issue at par of 15,000,000 francs preferred 5 per cent. stock. The latter will be offered to the old shareholders in proportion to their holdings, but a syndicate of bankers subscribes for all not so taken. This painful process is made acceptable to the stockholders by the fact that the price of their 500 franc shares on the exchange had fallen to 220. After the announcement of this plan it rose to about 330.

Mr. Carnegie on Pensions.

Andrew Carnegie talked Tuesday night last to the Railroad Branch of the Young Men's Christian Association at the Railroad Men's Building, 361 Madison avenue, New York. It was the twenty-sixth anniversary meeting of the association and Edward V. W. Rossiter, First Vice-President of the New York Central, was chairman. Robert Pitcairn and James D. Layng were among the audience. The three worked together as boys on the Pennsylvania, and Mr. Carnegie referred to them as "Bob" and "Jim" to vouch for some of the stories he told. Mr. Carnegie said in part: "It is one of the most cheering facts of our day that wages of labor tend to rise, and the price of the necessaries of life tends to fall. Every sober, capable and willing man finds employment at wages which with thrift and a good wife to manage will enable him to go far toward laying up a competence for old age. And here let one who has almost without intention or desire had himself loaded with somewhat more than a competence tell you soberly that what one has beyond this brings little with it, and sometimes nothing desirable with it. . . .

"Your sons who are to succeed you on the New York Central will run trains at a hundred miles an hour, double your present speed, just as you are running trains at double the speed of 30 years ago. In the improvements made to-day I think many managers do not look far enough ahead. They are spending perhaps half a million dollars where they ought to spend double, and easing the curves which they should abolish, and some future President will say that they wasted a good deal of money. Nothing but a straight line will be up to date in 1950, or before that.

"But not only in road and equipment has there been progress; it has been as great, and even greater, in the care of employees, their position, their advantages, their earnings, and in the pension system. I know of nothing which lifts and improves the service of a great line and adds so much to its safety as a staff which can rest in the knowledge that after they have grown old in the service their old age is made comfortable through the system of pensions. Before long no line will rank as in the front rank which has not this invaluable, I might almost say necessary, element, in securing a staff of trustworthy, intelligent, and loyal men filled with esprit de corps for the company they serve.

"Gentlemen, I congratulate you of the railroad world on occupying the proud position, as I believe, of the most temperate body of employees in the world. You are an example to the workingman in other fields. No rule that a man can adopt will bring greater reward than this, to abstain from the use of alcohol as a beverage. A drinking man has no place in the railway system. Indeed, he should have no place anywhere."

LOCOMOTIVE BUILDING.

The Cuba Company is having four locomotives built at the Rhode Island Works.

The Iowa Central has ordered six mogul engines from the American Locomotive Co.

The New Haven & Dunbar is having a locomotive built at the Baldwin Locomotive Works.

The Lake Shore & Michigan Southern is having 10 locomotives built at the Pittsburgh Works.

The Lake Erie & Detroit River has ordered three 45-ton mogul locomotives from F. M. Pease, of Chicago.

The Southwestern Coal & Iron Co. is having 23 locomotives built at the Baldwin Locomotive Works and 10 at Schenectady.

The Cincinnati, New Orleans & Texas Pacific is having two engines built at the Dickson Works of the American Locomotive Co.

The Pennsylvania has leased from the Duluth & Iron Range 50 locomotives for freight service, which are not in use during the winter.

The Southern Pacific has placed orders for 60 new freight engines, five passenger and 10 switch engines in addition to the 103 reported last spring. It is not stated where the order has gone.

The Vera Cruz & Pacific has placed an additional order for two 10-wheel engines for immediate delivery with F. M. Hicks. These engines will have 18-in. cylinders and small drivers, and will weigh 45 tons.

CAR BUILDING.

The Cane Belt has ordered two caboose cars from the American Car & Foundry Co.

The Chicago, Burlington & Quincy has ordered five cafe cars from the Pullman Company.

The Lake Shore & Michigan Southern has ordered 1,000 box cars from Haskell & Barker.

The Michigan Ammonia Works has ordered 10 tank cars from F. M. Pease, Chicago.

The Clarendon & Pittsford has ordered 25 flat cars from the American Car & Foundry Co.

The National Carbon Co. has ordered two new tank cars from F. M. Pease, of Chicago.

The Wheeling & Lake Erie is having 500 freight cars built at the Barney & Smith Works.

The Shawmut Coal Co., of Shawmut, Pa., is having 100 coal cars built at the Erie Works.

The Toledo & Ohio Central has ordered 1,000 coal cars from the American Car & Foundry Co.

The Delaware, Lackawanna & Western is having 200 box cars built at the Erie Car Works.

The Warren Refining Co., of Warren, Pa., has ordered 25 tank cars from the Erie Car Works.

The Northern Pacific is having 16 coaches built at the Barney & Smith Car Co., instead of 14, reported Nov. 8.

The Florida East Coast has ordered four parlor cars and 10 coaches from the American Car & Foundry Co.

The Algoma Central & Hudson Bay is building 200 flat and 100 box cars of 80,000 lbs. capacity at their new works.

The Belington & Beaver Creek is reported to have ordered 500 coal cars from the American Car & Foundry Co.

The Norfolk & Western has ordered 1,000 gondola cars, of 80,000 lbs. capacity, from the American Car & Foundry Co.

The New York Central & Hudson River has ordered 1,000 box cars and 1,000 coal cars from the Pullman Company.

The McCloud River has placed an order with F. M. Hicks for 60 flat cars 36 ft. long for January and February delivery.

The Cincinnati Southern is reported to have ordered 1,800 box, coal and flat cars from the Southern Car & Foundry Co., Birmingham, Ala.

The Mather Stock Car Co. is having 100 freight cars built at the South Baltimore Car Works instead of 50, as reported in our issue of Dec. 20.

The Cincinnati, Richmond & Muncie is reported to have leased 60 box cars, 15 flats, four cabooses and five cars for passenger service from the Laconia Car Co., of New Hampshire.

The Atchison, Topeka & Santa Fe order with the American Car & Foundry Co. for 4,200 cars, referred to in our issue of Dec. 20, calls for 1,500 stock, 1,500 box, and 1,200 refrigerator cars.

The Hocking Valley order for coal cars, reported in our issue of Jan. 3, has been divided as follows: 1,500 from Barney & Smith, 1,000 from the Pullman Co., and 500 from the American Car & Foundry Co., to be built at Detroit for April and May delivery, Hocking Valley specifications.

The Pittsburgh & Lake Erie has ordered 1,000 box cars of 80,000 lbs. capacity from the American Car & Foundry Co. for April and May delivery. They will be 36 ft. long, 8 ft. wide and 8 ft. high, inside measurement. The specifications include steel axles, Common Sense bolsters, solid brake beams, cast-iron brake-shoes, Westinghouse air-brakes, Lawrenceville bronze brasses, solid couplers, Harrison dust guards, new journal boxes and lids, M. D. Suydam & Co.'s paint, Chicago roofs, Pickering springs, box trucks and cast-iron wheels.

The Illinois Central order with the American Car & Foundry Co., reported in our issue of Jan. 10, calls for 500 ventilated fruit cars of 60,000 lbs. capacity. They are to measure 36 ft. long, 8 ft. 6 in. wide and 8 ft. high. The specifications call for M. C. B. axles 4¼ x 8 in.; Common Sense bolsters, pressed steel brake-beams, M. C. B. cast-iron brake-shoes, Westinghouse air-brakes, Hewitt Mfg. Co.'s brasses, special doors, Gould draft rigging, malleable iron journal boxes and lids, Sherwin, Williams & Co.'s paint, plastic roofs, A. French springs, Kindl trucks and American Car & Foundry Co.'s wheels.

The Chicago, Milwaukee & St. Paul order, reported in our issue of Jan. 3, calls for 500 wooden carriage cars and 100 ore cars. The carriage cars will weigh 37,900 lbs. and measure 49 ft. 6 in. long, 8 ft. 9 in. wide and 9 ft. 3 in. high, all inside measurement. The special equipment includes iron axles, double plate bolsters, Congdon brake-shoes, Westinghouse air-brakes, Jones doors, Miner draft rigging, pressed steel journal box lids, Prince's mineral paint, Murphy roofs and Barber trucks. The ore cars will be of 100,000 lbs. capacity and contain 580 cu. ft. They will weigh 28,770 lbs. and measure 21 ft. 4¼ in. long and 8 ft. 3½ in. wide over the frames. The height from rail to top of the side will be 9 ft. 1 in. The special equipment includes iron axles, single plate bolsters, Congdon brake-shoes, Westinghouse air-brakes, pressed steel journal box lids, Prince's mineral paint and Barber trucks.

BRIDGE BUILDING.

ARKANSAS.—The United States Senate on Jan. 8 passed a bill authorizing the Southern Missouri & Arkansas Railroad Co. to build and maintain a bridge across Current River, in Randolph County, Township 19, Arkansas. The plans and any proposed changes in plans must be submitted to the Secretary of War, and any changes ordered by him must be made at the expense of the railroad company.

AKRON, OHIO.—The Northern Ohio Traction Co., of Cleveland, is having plans made for the proposed 400-ft. double-track bridge over the Gorge near Akron, which is to cost about $60,000.

BRIDGEPORT, CONN.—An officer of the New York, New Haven & Hartford R. R. writes that the contracts for the remaining bridges in Bridgeport, in connection with the plan to elevate the tracks, have not been let and he cannot state how soon the company will send out for bids.

BRIDGETON, N. J.—The Board of Chosen Freeholders is reported considering building a bridge across Maurice River at Point Norris.

BUTLER, TENN.—A committee has been appointed to get particulars for a bridge over Watauga River near Butler in Johnson County. L. L. Goodwin, Butler, member of the committee.

CANAJOHARIE, N. Y.—Bills have been introduced in the State Senate re-appropriating $8,500 and $4,180 and appropriating a further sum of $10,000 for the proposed bridge over the Erie Canal in this village.

CAPE VINCENT, N. Y.—The War Department has notified the New York Central & Hudson River R. R., to put a draw in its bridge over the Chaumont River at this place.

CHESTER, PA.—The contract for the masonry work for the retaining walls and bridges over Penn street to the city limits in Chester, has been let to C. A. Sims, of Philadelphia. The work included five bridges.

CHICAGO, ILL.—The Trustees of the Sanitary District of Chicago are advertising for bids for the sale of about $2,000,000 worth of bonds which, according to report, will be devoted toward building new bridges and improving the Chicago River.

The Drainage Board is considering building a new bridge across the Illinois & Michigan Canal at Ashland avenue.

CRAWFORDSVILLE, IND.—The Monon R. R., according to report, will build a truss bridge at Crawfordsville early in the spring.

DULUTH, MINN.—Regarding our statement in the issue of Jan. 3, the City Engineer writes us that the wooden bridges on the road to West Duluth are wooden trestles, and if replaced, will probably be abandoned and the ravines filled except one at the crossing of the Northern Pacific tracks, where surveys are now being made preparatory to making plans and estimates for an underhead crossing. These plans will be ready within the next month.

DUNMORE, PA.—The Council has appointed a committee to wait on the Scranton Gas & Water Co. in regard to rebuilding a bridge at Nay Aug to replace the one that was washed away recently.

DURHAM, ONT.—The taxpayers recently voted to build a new bridge. Address the Town Clerk.

ELIZABETHTON, TENN.—The County Court of Carter County is considering appropriating $17,500 for building the three steel bridges located as follows: Elizabethton, Allentown and Roan Mountain. An additional appropriation of $2,500 was made for the Butler bridge which will be built at the expense of Johnson and Carter counties.

GRAY'S POINT, MO.—A special Board of Engineers representing the War Department met at St. Louis last week to consider the plans for a bridge across the Mississippi River at Gray's Point. This is the bridge authorized by the act of Congress for the Southern Illinois & Missouri Bridge Co., in which are interested the Chicago & Eastern Illinois, the St. Louis Southwestern and the Missouri Pacific railroads. C. G. Warner, of the Missouri Pacific, is President of the bridge company.

HOLYOKE, MASS.—Arthur B. Chapin, Mayor, writes that the bridge over Three-Level Canal at Main street is merely being agitated.

HYATTSVILLE, MD.—The County Road Committee has authorized a bridge over Northwest Branch on Chillum Road.

JERSEYVILLE, ILL.—Plans have been made for a 100 ft. steel bridge, with 25 ft. of approach on each end over Macoupin Creek. H. M. Minton, Engineer, Carlinville, Ill.

JOHNSON CITY, TENN.—The East Tennessee & Western North Carolina Ry. has built temporary bridges in place of the bridges washed away a few days ago, and it is understood that plans are being made for steel bridges. The contract will soon be awarded.

KANSAS CITY, MO.—A bill has been introduced in the United States Senate authorizing the Kansas City & St. Joseph Electric R. R. to build a bridge over the Missouri River at Kansas City. Homer Reed, of Kansas City, is the local representative.

MASONTOWN, PA.—Wm. N. Gulick, State Engineer, is reported to have made surveys for a bridge at this place, and for one at Franklin.

MORRISVILLE, N. J.—A new bridge over the canal on Bridge street is provided for in the ordinance for the Philadelphia & Langhorne Street Ry. Co., now before the Council.

MILWAUKEE, WIS.—The Supreme Court has declared unconstitutional the law authorizing the County of Milwaukee to issue $275,000 bonds for a viaduct across Menominee Valley at the west end of Grand avenue. The work will have to wait for a new law to be passed by the Legislature.

NILES, OHIO.—We are told that the Commissioners of Trumbull County are considering building a girder bridge over Mosquito Creek in Niles. Wm. Wilson, City Engineer.

NEW SOUTH WALES.—The time for receiving bids for the large bridge proposed at Sydney Harbor, which was originally set for Feb. 28, has been extended to March 31. Bids are to be sent to the Department of Public Works at Sydney before that date.

NORTHAMPTON, MASS.—A bill is before the Legislature for an appropriation to have bridges built at the grade crossings of Grove and Earle streets and Leipoldt's.

NORFOLK, VA.—R. Lancaster Williams, of Richmond, tells us that he is interested in a bill now before the Virginia State Legislature to incorporate a company to build a steel bridge over Elizabeth River between Norfolk and Berkeley.

T. J. Wool, attorney for the Norfolk & Newport News R. R. Co. has petitioned the Board of Harbor Commissioners and has submitted plans for a bridge from the Portsmouth side of Elizabeth River. According to his plans, the bridge will be about 2,200 ft. south of the Western Branch toll bridge, and the structure will have a steel draw of 50 ft. opening.

NORRISTOWN, PA.—The Philadelphia & Reading R. R. has let a contract to the Phoenix Bridge Co. for two bridges over Schuylkill River north of Norristown. One of these bridges will consist of 10 spans of 72 ft. 10 in. each, the other bridge will consist of nine spans of the same dimensions. They will be of deck plate girders.

OMAHA, NEB.—The South Omaha R. R. & Bridge Co. has filed articles of incorporation, with a capital stock of $500,000. It is proposed to build a bridge over the Missouri River at South Omaha, to be used as a railroad and highway bridge. The incorporators are A. C. Foster, C. S. Gleed, Frank H. Parsons, F. W. Blackburn and John L. McCague.

PEMBROKE, ONT.—Representatives of the town and county will hold a meeting the latter part of this week to discuss the question of building a steel bridge over Ottawa River at this place.

PITTSBURGH, PA.—The Pittsburgh & Lake Erie, according to report, will replace a number of short steel and iron spans with stone structures. The single-track bridge over the Ohio River at Beaver will be widened at a cost of about $850,000.

J. Guy McCandless, Director of the Department of Public Works, announces that there is enough money on hand to build the Lincoln avenue bridge and to rebuild South Tenth street bridge. It will be remembered that the contract for the South Tenth street bridge had been let but later canceled. Both these bridges and the Wilmot street bridge have been proposed for a long time. The Lincoln avenue bridge will cost about $180,000, while the South Tenth street bridge will cost about $560,000. The latter bridge is to be 50 ft. wide.

PLATTSMOUTH, NEB.—A pontoon bridge will be built over Missouri River at a point south of the Burlington Bridge. Mayor Thomas Parmalee is interested.

PORT HASTINGS, P. E. I.—The promoters of the project for a bridge over the Strait of Canso, which we gave recently, have made application to the Nova Scotia Legislature for a charter. P. S. Archibald, of Moncton, N. B., is reported as making the surveys.

REDLANDS, CAL.—The City Clerk is reported ordered to advertise for bids for three bridges.

ST. PAUL, MINN.—The City Engineer is making plans for widening the bridge to Harriet Island. A report says that the City Clerk has been ordered to advertise for bids for this work.

SAN BERNARDINO, CAL.—The Clerk of the Board of Supervisors is reported ordered to advertise for bids for a bridge across San Timoto Creek; also for a bridge near Redlands Junction, and for bridges over Morey Arroyo.

SANTA FE, N. MEX.—The Santa Fe Central will build a viaduct over the tracks of the Atchison, Topeka & Santa Fe, near Oritz.

SIOUX CITY, IOWA.—According to local report, the city is considering building a viaduct over the railroad tracks in Iowa street.

Preliminary action towards straightening the Floyd River was taken by the City Council, Jan. 7. The City Clerk was ordered to notify the Chicago & North Western R. R., which is building a large steel bridge over the river, that the Council proposes to change the course of the river.

VICTORIA, B. C.—The City Engineer of Victoria has been ordered by the City Council to report upon the question of building a stone bridge at Point Ellice instead of an iron or steel bridge as at first proposed. This bridge will be a large structure and will probably provide for two electric railroad tracks, vehicle traffic, and have two footpaths.

WALLA WALLA, WASH.—We have already mentioned the fact that the Washington & Columbia River R. R. will build a through pin-connected bridge over Umatilla River, near Pendleton, Ore., and that the contract will soon be let. This company will also build a steel bridge over Walla Walla River at Wallula, where a 700-ft. span, estimated to cost $50,000, will be built. After that the Touchet will be bridged at Riverside, where a 500-ft. bridge will be built at a cost of about $35,000. It is probable that these contracts will be awarded at the same time. The contract for the masonry work has been let to G. F. Schorr, of Spokane.

WATERVILLE, ME.—Chief Engineer Edwin D. Graves, of the Connecticut River Bridge Commission, Hartford, Conn., has made plans for the bridge which is to be built over the Kennebeck River at Waterville.

WATERLOO, IOWA.—Bids, according to report, are wanted at the end of this month for a steel or concrete bridge over Cedar River at Fourth street, 550 ft. long. M. L. Newton, City Engineer.

WESTON, W. VA.—The County Court which is now in session, it is said, will arrange for the immediate building of iron bridges in the county. One will cross Polk Creek at Weston, the other will span Canoe Run near Roanoke.

WOODSTOCK, VA.—Bids are wanted, on Jan. 25, by the Road Board of Davis District for the substructure and superstructure of a steel bridge 235 ft. long over North Fork of Shenandoah River. J. Stickley, Strasburg, President of the Board.

YANKTON, S. DAK.—A bill in the United States Senate extends the time for the building of a combined railroad, wagon and foot-bridge across the Missouri River, to be built by the Dakota Southern R. R. Co., from March 3, 1903, to March 3, 1905.

Other Structures.

AUGUSTA, GA.—Frank P. Milbourn, of Columbia, S. C., is reported to be making plans for the new passenger station in this city to be used by the Southern, the Atlantic Coast Line, the Louisville & Nashville and Georgia railroads. The station will be built by the Augusta Union Station Co., which has been incorporated with a capital stock of $75,000. The various railroad companies are the stockholders. The new company is about to issue bonds to cover cost of construction and will probably soon be ready to receive bids.

BUFFALO, N. Y.—It is reported that the Pennsylvania R. R. has under consideration plans for enlarging its coal and ore docks at Buffalo.

CANTON, OHIO.—The Canton Bridge Co. proposes to make some improvements and extensions to the plant during the next few months.

CARNEGIE, PA.—The Columbia Bridge Co., of Pittsburgh, with works at Carnegie, has made application under its Pennsylvania charter to increase its capital from $100,000 to $500,000. It is said new capital has been interested in this company and it now proposes to build a bar mill with 500 tons capacity a day. It is proposed later to build open-hearth furnaces.

CHICAGO, ILL.—A grain elevator, the property of the American Malting Co., at Fifty-second street and the Panhandle R. R. tracks was destroyed by fire early in the week, causing a loss of about $275,000. The elevator was 150 ft. high and covered an area of 300 x 200 ft., and had a capacity of 300 bu. of grain.

DU BOIS, PA.—The Rochester & Pittsburgh Coal & Iron Co. will build a blast furnace here.

FORT WAYNE, IND.—The Pennsylvania Company, according to report, will extend the freight house at this place.

HARRISBURG, PA.—It is stated that the Philadelphia & Reading will begin work on its new passenger station in Harrisburg about March 1. The plans will be ready in about another month and then bids will be wanted.

HARRISON, N. J.—The International Steam & Pump Co., who recently bought the Clayton Air Compressor Co., of New York, will build a plant adjoining the Lackawanna Railroad in Harrison.

LANCASTER, PA.—The Lancaster Malleable Iron Works has filed a deed of trust to secure an issue of bonds not exceeding $100,000, which, it is said, will be used immediately to enlarge the foundry and put in additional furnaces and cupolas to increase the capacity to 75 tons of malleable gray iron per day. McKeefrey & Co., of Leetonia, Ohio, has a controlling interest in this plant.

LANSING, MICH.—Plans are being made for the new passenger station for the Michigan Central and the Pere Marquette railroads by Messrs. Spier & Rohns, of Detroit.

MCKEESPORT, PA.—The McKeesport Mfg. Co., recently chartered in Pennsylvania with a capitalization of $300,000, has secured about 20 acres of ground at Port Vue on the Monongahela River above McKeesport, where a 10-mill tin plate plant will be built.

MCKEES ROCKS, PA.—The Pittsburgh & Lake Erie, according to report, will let contracts in a few days to the extent of about $500,000 for a new roundhouse, paint shop, and after these are let, contracts for machine shop, boiler shop, blacksmith shop and other buildings.

MINNEAPOLIS, MINN.—The Chicago, St. Paul, Minneapolis & Omaha is planning a large amount of property improvement and other work in this city which will include a freight house 40 x 468 ft., two stories high, and a new shop at Hudson, to cost $30,000.

NEW MARTINSBURG, W. VA.—An officer of the Baltimore & Ohio advises us that there is no truth in the report that the company will build shops at New Martinsburg.

ONAWA, IOWA.—The Chicago & North Western is reported having plans made for a new station and other work in this city.

PITTSBURGH, PA.—It is reported that the American Tin Plate Co. is considering plans for building a tin plate plant in the Pittsburgh District, where tin plate will be made by a new method.

According to reports, the Wabash R. R. is about ready to take up the plans for the terminal station in this city.

ST. PAUL, MINN.—The Burlington, Cedar Rapids & Northern is reported to have recently bought considerable acreage in West St. Paul to build freight houses.

SHARON, PA.—The Sharon Steel Hoop Co., according to report, will soon begin work on additions and improvements to its plant which will cost $1,000,000. The company intends to build its own open-hearth steel plant and two additional mills to make steel hoops and cotton ties.

SIOUX CITY, IOWA.—The Chicago & North Western contemplates building a large roundhouse in this city. The present roundhouse will be torn down and the ground on which it now stands will be used as a part of the car shops.

It is said that the car shops of the Omaha Road will be enlarged, the new building and additions to extend northward in Howard street.

STEUBENVILLE, OHIO.—Follansbee Bros., of Pittsburgh, are reported to have decided to build their proposed plant at this place. Their Engineer, Edward E. Erikson, is making plans for an eight-mill tin plate plant to cost about $400,000.

SYRACUSE, N. Y.—The New York Central & Hudson River R. R., according to report, will build another roundhouse at the DeWitt yards.

TOLEDO, OHIO.—The Marine Boiler Works will build a boiler shop in this city 325 x 100 ft.

TOPEKA, KAN.—The Atchison, Topeka & Santa Fe has a building permit from the city for its proposed $100,000 boiler shop. The building will be of brick, steel and slate. This is part of the shop plant which this company has in contemplation in this city.

TRENTON, N. J.—The Trenton Iron Co. is about to begin work on additions to the plant which will cost about $26,000. The principal addition will be an annex to make wire rope.

UNIONTOWN, PA.—The Keystone Foundry Co. contemplates building an addition to its plant to double the present capacity. It will be 70 x 100 ft.

WASHINGTON, D. C.—Plans have been completed by the Bureau of Yards and Docks, Navy Department, for the proposed coaling station at the Puget Sound Navy Yard, and the estimated cost is $300,000. It is intended to have two coaling sheds, a wharf 650 ft. long, and the best obtainable coal handling machinery. The Bureau already has $128,000 toward the building of the plant and will soon let contracts for a coaling shed to cost $112,500, and for dredging to cost $15,500.

MEETINGS AND ANNOUNCEMENTS.

(For dates of conventions and regular meetings of railroad associations and engineering societies see advertising page xvii.)

Western Society of Engineers.

Mr. P. A. Maignen, of Philadelphia, Pa., presented a paper before the Western Society of Engineers, Wednesday evening, Jan. 15, entitled "Water Filtration." Lantern slides were used as illustrations.

M. C. B. and M. M. Conventions.

The United States Hotel, Saratoga Springs, N. Y., will be opened this year June 9 and, therefore, in ample time to accommodate any members of the Master Car Builders' and Master Mechanics' conventions who care to stop at that place. The hotel, as those familiar with Saratoga know, is a short distance from the headquarters of the Master Mechanics' and Master Car Builders' Associations and opposite the place of meeting. As in previous years, the United States Hotel will pay special attention to guests of the convention and applications for rooms can be made now.

The Engineers' Club.

The annual meeting of the Engineers' Club (New York) was held Tuesday evening, Jan. 14. The following trustees were elected: To serve until annual meeting, 1903, W. J. Taylor; to serve until annual meeting, 1904, D. L. Hough; to serve until annual meeting, 1906, C. Vanderbilt; C. M. Wales, H. G. Prout, W. A. Redding. W. E. Baker. After the general meeting the trustees met and elected the following officers for the year: President, John C. Kafer (re-elected); First Vice-President, H. G. Prout; Second Vice-President, W. H. Fletcher; Treasurer, Geo. E. Weed; Secretary, C. W. Baker.

New York Electrical Society.

The 220th meeting of the Society was held at the College of the City of New York, Wednesday, Jan. 15. Dr. F. A. C. Perrine, President of the Stanley Electric Manufacturing Company, formerly Professor of Electrical Engineering at Leland Stanford, Jr., University, Cal., delivered a lecture on "The Power Plants of the Pacific Coast." Dr. Perrine has recently made an extensive trip throughout California and the Far West, investigating the present situation of power transmission work there, and he told of his observations and showed a large number of lantern views of the most notable plants. The work that has been done in California includes the longest transmissions and the highest voltages in the world.

The Engineers' Club of Philadelphia.

The twenty-third annual meeting of the Club will be held on Saturday, Jan. 18, 1902, at 8 o'clock p.m. Mr. Carl Hering will present the following for consideration and adoption by the Club:

In view of the fact that bills for the adoption of the metric system of weights and measures by the United States are to be considered during the present session of Congress, the Engineers' Club of Philadelphia hereby expresses its indorsement of the adoption of such system.

The object of the Appalachian Park Association will be explained, and a recommendation of the Board of Directors that the Club as a body should join it will be acted upon.

The address of the retiring President will be "Ancient Metallurgy," by Henry Leffman.

Canadian Society of Civil Engineers.

The sixteenth annual meeting for the election of the Council for 1902, and for the transaction of other business, will be held as follows:

Monday, Jan. 27.—10:00 a.m., meeting for the nomination of Scrutineers and the transaction of the general business of the Society; adjournment at 1:00 p.m. 4:30 to 6:00 p.m., tea in the rooms of the Society, to which it is intended to invite as large a number as possible of the friends of the Society. 8:30 p.m., illustrated lecture on the Shawinigan Water and Power Development, by Mr. Wallace C. Johnson, M. Can. Soc. C. E.

Tuesday, Jan. 28.—On the invitation of the Shawinigan Water & Power Co. there will be an excursion to Shawinigan Falls, P. Q., for the purpose of visiting the Power Development, and other works of engineering interest there. A special train, which will leave Place Viger Station at 8 a.m., has, by the courtesy of the Canadian Pacific Railway, been placed at the disposal of the Society for this purpose. Tickets for this excursion, which will be complimentary, and limited strictly to those connected with the Society, must be secured from the Secretary in advance. 8:00 p.m., members' dinner at the Place Viger Hotel, Montreal.

Wednesday, Jan. 29.—10:00 a.m., meeting to receive the reports of Scrutineers, and other business. 1:00 p.m., informal luncheon in the rooms of the Society. 2:30 p.m., reading of presidential address, and conclusion of the business of the meeting. By the kindness of the Grand Trunk, Canadian Pacific, Intercolonial, and Canada Atlantic Railways, members and their families who shall have paid full one way first class fare going to the meeting in Montreal, will be returned free, on presentation of a certificate. The Canadian Pacific Railway has, by special arrangement, granted an extension of the usual three days' limit to persons residing in British Columbia and the North West, to permit them to avail themselves of the free return.

Western Society of Engineers.

The Western Society of Engineers held its thirty-second annual meeting and banquet Tuesday evening, Jan. 7, at the Auditorium Hotel, Chicago. The election of officers for the ensuing year resulted as follows: President, W. H. Finley, Principal Assistant Engineer, Chicago & North Western; First Vice-President, Ralph Modjeski, Consulting Engineer, Chicago; Second Vice-President, Prof. L. P. Breckenridge, University of Illinois; Treasurer, J. C. Whitridge, Associate Editor *Railroad Gazette*, and trustee for three years, J. W. Alvord, Consulting Engineer, Chicago.

In his address, the retiring President, Mr. Octave Chanute, reviewed the history of the Society. He pointed out that the most important step taken by the Society was in publishing its own proceedings, the Society having grown rapidly since the "Journal" made its appearance. He urged the members to take an active part in furnishing papers and discussions and improving the "Journal." A number of other suggestions were made,

but evidently Mr. Chanute is convinced that the "Journal" is the key to making the Western Society of Engineers a broad and important organization, as against a local organization of use chiefly to Chicago engineers. The first announcement made by Mr. Finley, upon taking the chair, confirms this view.

The new President said that he held a check for $1,000, given to the Society by Mr. Chanute to start a fund, the income from which should be available for annual prizes for the best technical papers presented before the Society. Mr. T. L. Condron offered a resolution to the effect that the Society accept this donation, and that it be known as the "Octave Chanute Prize Fund."

The following is a list of the speakers: Dr. F. W. Gunsaulus, President of Armour Institute; N. H. Stewart, Attorney Michigan Central R. R.; C. W. Andrews, Librarian John Crerar Library; P. Glasenapp, Engineer, Attache German Embassy; Isham Randolph, Chief Engineer of the Sanitary District; W. Sooy-Smith and L. Morehouse and W. J. Karner, both of the Illinois Central R. R.

Convention of National Association of Railway Commissioners.

The fourteenth annual convention of this association will be held at the Charleston Hotel, Charleston, S. C., on Tuesday, Feb. 11. Membership in the association is fixed by the following rules:

"Active membership shall embrace only the Interstate Commerce Commissioners, the railway commissioners or deputy commissioners of the several States and Territories of the Union, and in those States and Territories having no railroad commissions, State officers who by law exercise active supervisory powers over the affairs of railroads; also the secretary and assistant secretary of the Interstate Commerce Commission, and the secretary or clerk of each State Railway Commission where such office is created by law.

"Honorary membership shall include former members of the association, a committee of three from each steam or street railroad accounting association, the statistician of the Interstate Commerce Commission and of the several State Commissions, together with the engineers of said commissions.

"Active members shall be entitled to one vote each, if present, upon all questions coming before the association. Honorary members shall have the privileges of the floor and the right of debate, but shall not be entitled to vote."

Committees have been appointed to report on the following subjects:

1. Classification of operating and construction expenses of electric railways.
2. Grade crossings.
3. Railroad taxes and plans for ascertaining fair valuations of railroad property.
4. Classification of operating and construction expenses of steam railways.
5. Uniform classification and simplification of tariff sheets.
6. Railroad statistics.
7. Legislation.
8. Safety appliances.
9. Delays attendant upon enforcing orders of railway commissions.
10. Rates and rate making.
11. Form for reports of electric railways (conference with committee of Street Railway Accountants' Association of America.)

The Executive Committee consists of: Isaac B. Brown, Harrisburg, Pa., Chairman; Ashley W. Cole, Albany, N. Y.; Graham L. Rice, Madison, Wis.; E. G. Akers, Richmond, Va.; John V. Smith, Montgomery, Ala.; Cicero J. Lindly, Greenville, Ill.; Edward A. Moseley, Washington, D. C.

As questions of unusual importance are likely to be brought up for discussion at the coming meeting, the President, Mr. Lindly, urges the fullest possible attendance. Edward A. Moseley, Secretary of the Interstate Commerce Commission, Washington, is Secretary of the Association.

PERSONAL.

(For other personal mention see Elections and Appointments.)

—Mr. J. F. Pidcock, President of the Georgia Northern Railway, died at his home in Whitehouse, N. J., Jan. 12.

—Major Thomas L. Casey, Corps of Engineers, U. S. Army, has been nominated by the President for appointment as a member of the Mississippi River Commission, succeeding Lieut.-Col. Thomas H. Hanbury, relieved.

—A brief sketch of the life of the new General Manager, Mr. W. C. Nixon, of the Gulf, Colorado & Santa Fe, appeared at the time Mr. Nixon was appointed General Superintendent of this company, and will be found in our issue of Jan. 5, 1900.

—Mr. Galan B. Owen, who was recently appointed Division Engineer of the Pittsburgh Division of the Baltimore & Ohio, is 42 years old and entered railroad service in 1880 as a rodman on the Lehigh Valley. The following year he became Assistant Engineer, then for seven years was Roadmaster and Engineer of Construction, and in August, 1896, was appointed Division Engineer of Maintenance of Way of the Baltimore & Ohio, later becoming Superintendent of Maintenance of Way.

—Mr. A. M. Schoyer who, on Jan. 1 last, succeeded Mr. Watts as General Superintendent of the North West System of the Pennsylvania Lines West of Pittsburgh, was born Nov. 7, 1859, and entered railroad service as a messenger in 1872. From this position he gradually rose to that of General Superintendent, having passed through various subordinate positions, such as telegraph operator, Train Despatcher, Superintendent of Telegraph from 1892 to 1899, and Superintendent of the Eastern Division. As will be noticed Mr. Schoyer's entire career has been with this company.

—Mr. W. L. Barnes, Superintendent of Car and Special Freight Service of the Chicago, Burlington & Quincy, was born Sept. 12, 1857. His whole railroad career has been with this company. Starting as night operator at Kirkwood, Ill., in 1875, he served as day operator and relief agent at various stations until 1880, when he was promoted to the position of train despatcher. In March, 1893, he became Trainmaster and the following year was transferred to the Galesburg Division as Chief Despatcher. He received his new appointment, that of Superintendent of Car and Special Freight Service, on the first of this month.

—The new Assistant to the First Vice-President of the Pennsylvania Company, Mr. S. C. Scott, is a native of Ohio, having been born at Toledo, April 4, 1854. His railroad career dates from 1872, when he began on the Pittsburgh & Connellsville. Two years later he entered the service of the Pennsylvania Railroad, but in 1875 left the railroad service and was for four years (1878-1882) a practicing physician. In the last named year (1882) he re-entered railroad service as a clerk in the Manager's office of the Pittsburgh, Cincinnati & St. Louis, and in 1885 became Chief Clerk to the General Manager of the Pennsylvania Company. From then until his recent appointment, as stated above, Mr. Scott has been Chief Clerk to several of the higher officials of this company.

—Mr. O. E. Stewart, who, on Jan. 1, was transferred to the Creston Division of the Chicago, Burlington & Quincy as Superintendent, was born Oct. 11, 1844, in Henry County, Iowa. Mr. Stewart entered railroad service in 1868 with this company and, except for a short period, has served on the Burlington System ever since; holding various positions, such as Agent, Telegraph Operator, Ticket Agent and Train Despatcher. In 1874 he went to the Central Pacific, but later returned to the Chicago, Burlington & Quincy as Train Despatcher. Later he became Trainmaster, then Superintendent of Telegraph and for seven years was Assistant Superintendent. In July, 1889, he was appointed Superintendent of the Eastern Iowa Division, and in 1901 Superintendent of the Ottumwa Division, from which position he has just been transferred.

ELECTIONS AND APPOINTMENTS.

Atchison, Topeka & Santa Fe.—Owing to ill health C. M. Atwood, Auditor of Passenger Receipts, has been granted a three months' leave of absence.

Atlantic Coast Line.—The position of Assistant Superintendent of Transportation, held by J. A. Fountain, has been abolished.

Baltimore & Ohio Southwestern.—J. M. Ryan has been appointed General Agent, freight department, succeeding E. Hart, Jr., promoted.

Cane Belt.—D. J. Timlin, heretofore Master Mechanic of the Texas Central, has been appointed Master Mechanic of the C. B., with headquarters at Bay City, Texas. L. Levy has been appointed Superintendent, succeeding W. W. Edwards, resigned.

Chicago & North Western.—A. Keep, Chairman of the Board of Directors, has resigned the chairmanship.

Chicago, Rock Island & Texas.—C. B. Sloat, General Passenger Agent, with headquarters at Fort Worth, Texas, has resigned.

Chicago Short Line.—F. C. Wright has been appointed General Manager, succeeding C. L. Lingo.

Cincinnati Northern.—T. C. M. Schindler, General Freight and Passenger Agent, has resigned.

Cleveland, Cincinnati, Chicago & St. Louis (Peoria & Eastern).—J. A. Gibson has been appointed Division Master Mechanic, with headquarters at Urbana, Ill., succeeding J. McClurg, resigned.

Duluth, Missabe & Northern.—E. S. Kempton has been elected First Vice-President. M. A. Carroll becomes Secretary, and J. B. Cotton has been appointed General Solicitor.

Great Northern.—J. G. Drew, heretofore Assistant Comptroller, has been appointed Comptroller. N. Terhune has been appointed Secretary and Assistant Treasurer.

Houston & Texas Central.—Jeff N. Miller, heretofore Acting Manager, has been appointed Manager.

Houston East & West Texas.—Samuel Milligan has been appointed Master Mechanic, succeeding A. S. Grant, resigned.

Illinois Southern.—On Jan. 7, J. W. Walsh was elected President, succeeding C. H. Bosworth, resigned, and J. C. Jacobs Treasurer, succeeding Mr. Walsh.

International & Great Northern.—A. L. Bowers, heretofore Superintendent in Charge of Maintenance of Way, has been appointed Superintendent of Construction of Bridges, Buildings and Water Service.

Lake Erie & Western.—H. S. Storrs has been appointed Assistant General Superintendent, succeeding H. F. Bickell, transferred.

Mexican Central.—J. J. Maguire has been appointed Assistant Purchasing Agent; office at New York City.

Ocilla, Pinebloom & Valdosta.—O. J. Lloyd has been appointed General Manager, succeeding A. Kirkland.

Rio Grande & Eagle Pass.—E. W. Wager has been elected Vice-President and General Freight and Passenger Agent, succeeding C. D. Fraser, resigned.

Santa Fe, Prescott & Phoenix.—The officers of this company are: F. M. Murphy, President; E. D. Kenna, Vice-President; Wallace Fairbank, Secretary and Treasurer; L. C. Deming, Assistant Secretary; and Victor Morawetz, General Counsel.

Seaboard Air Line.—On Feb. 1, W. H. Pleasants will become Traffic Manager of the S. A. L., succeeding H. W. B. Glover.

Southern Pacific.—W. S. Palmer has been appointed Superintendent of the Western Division (Pacific System), succeeding James L. Frazier, resigned. F. E. Prior becomes Superintendent of the Sacramento Division, succeeding Mr. Palmer, and Mr. Prior in turn is succeeded by E. L. Swaine as Assistant Superintendent of the Los Angeles Division.

Texas Midland.—W. Henry has been appointed Master Mechanic, with headquarters at Terrell, Texas, succeeding N. L. Smitham, resigned.

Texas Southern.—E. B. Sherman has been appointed Auditor, with headquarters at Marshall, Texas, succeeding E. B. Couch, resigned.

Toledo, St. Louis & Western.—D. F. Milne, Superintendent of Car Service, has resigned.

Wheeling & Lake Erie.—Since Jan. 1, the Zanesville Belt & Terminal Railway has been operated as part of the Cleveland Division of the W. & L. E. T. R. Gillmore has been appointed Superintendent of the Huron Dock, with headquarters at Huron, Ohio.

Wisconsin Central.—C. W. Booth has been appointed Purchasing Agent, with headquarters at Milwaukee, Wis., succeeding J. A. Whaling, resigned.

RAILROAD CONSTRUCTION.

New Incorporations, Surveys, Etc.

BALTIMORE & FREDERICK ELECTRIC.—This company has been incorporated at Baltimore, with a capital stock of $1,500,000, to build an electric road 45 miles long from the western suburbs of Baltimore, to Frederick. F. H. Calloway, of Baltimore, is interested.

CANE BELT.—This company announces that its branch line between Llano City and Garwood, Texas, is completed. Train service is to be put on shortly and new towns along the line are being settled.

CAPE BRETON.—This company has built, during the past year, something over 100 miles of railroad, and has graded 40 miles additional.

CAROLINA NORTHERN.—Surveys are reported for an extension of this line in North and South Carolina south from its present terminus at Marion. Contracts are likely to be let within a couple of months. The portion of the line between Lumberton, N. C., and Marion, S. C., 47 miles, was completed last fall. Augustus Mellier, 316 Bourse Building, Philadelphia, is President.

CHICAGO, BURLINGTON & QUINCY.—A new survey has been ordered between Hastings and Pacific Junction, Iowa. The distance between these points over the present line is 20 miles.

CHICAGO GREAT WESTERN.—The first contract for grading on the Sioux City extension was let to Geo. M. Kepner of Lake City, Iowa, recently. The contract is for a fill one mile long and of an average width of 35 ft., involving the removal of 300,000 cu. yds. of earth. This mile of grade, which will extend along the east side of Coon River to a point seven miles southwest of Lake City, will be topped off by McArthur Bros., of Lake City. Mr. Kepner's portion of the contract must be finished by Aug. 15. (Construction Supplement, Oct. 11, 1901.)

CHICAGO, MILWAUKEE & ST. PAUL.—It is stated that very extensive improvements are to be made on the company's lines during the present year, involving an expenditure of at least $2,500,000. It is intended to double track the La Crosse Division from Brookfield to La Crosse, a distance of 182 miles, and after this is completed, the work is to be carried on to Chicago, which is 282 miles from La Crosse. The bridges needed for this work were mentioned in our bridge news, Jan. 3, p. 12.

It is stated that the line between Dubuque, Iowa, and La Crosse, Wis., is to be shortened eight miles during the present year by taking out curves, and that work will begin early in the spring.

CHICAGO, ROCK ISLAND & TEXAS.—An amendment to the charter of this company, which is the Texas incorporation for the Chicago, Rock Island & Pacific, was filed with the Secretary of State at Austin, on Jan. 7. The amendment provides for a line of railroad to be built from Jacksboro, in Jack County, Texas, at the present terminus of the company's branch line between Bridgeport and Jacksboro, west to Graham, Young County, a distance of 26 miles.

CHICAGO, ST. PAUL, MINNEAPOLIS & OMAHA.—This company is said to have bought a tract of land in Sioux City a mile long and 400 ft. wide, on which it is proposed to build large additions to the company's shops. The remainder of the ground is to be used for a system of terminals and storage tracks.

It is reported that the company is also planning to build a line from La Mars, Iowa, to Sioux City. At present the tracks of the Illinois Central are used between these points, 25 miles. When this connecting link is built, the company will have a continuous line from Omaha to St. Paul and Minneapolis.

DAVENPORT & WESTERN ELECTRIC.—This company was incorporated in Iowa, Jan. 8, with a capital stock of $150,000, with headquarters at Davenport. It is proposed to build an electric line between Davenport and neighboring cities and towns. Robert Kerchebal, of Davenport, is President.

DECATUR & DANVILLE.—Surveys are reported for this line beginning at Jasper, Ala. The line will run from Decatur to Jasper, a distance of 80 miles, and it is said that future extensions are planned to Tuscaloosa, and eventually to Selma. Tuscaloosa is 50 miles from Jasper. The road is said to be largely backed by Cincinnati men.

GRAND TRUNK OF CANADA.—In reference to double-tracking of the company's lines, an officer writes that the work is completed between Hamilton and Jordan, a distance of 26 miles, and the remaining 17 miles to Niagara Falls will be proceeded with during the approaching summer. The plans involve double tracking between Chicago and Port Huron.

IRONDALE, BANCROFT & OTTAWA.—This railroad, now in operation between Kinmount, on the Haliburton Branch of the Grand Trunk to Bancroft, 50 miles east, and subsidized for 15 miles more, is to be completed this year by the addition of 65 miles, making a total of 115. L. B. Howland, of Irondale, Ont., President, has been promised by the Ontario Government a subsidy for this additional 50 miles. The terminus of the line is to be near Caldwell Station on the Canada Atlantic, close to the Ottawa River.

KINSTON & CAROLINA.—This company, reported Jan. 3, page 14, as having applied for incorporation of a new line, now operates 22 miles of road, and will put on passenger accommodations at once. It has previously been used entirely for freight, and during 1901 did a freight business of about $15,000. The capital stock for the extension in North Carolina is $500,000 and the incorporators are: J. M. Parrott and others, of Kinston, N. C.; J. C. Chapman, of Scranton, Pa., and C. D. Knapp and others, of New York. Incorporation was granted Dec. 28.

KONA-KAU.—The engineers have gone to Hawaii to start work on this projected line, which it is planned to build on the west coast of the island. One hundred and fifty miles was projected, and it is estimated that the work will take two years. The company is capitalized at $2,000,000, and Jacob Coerper, of Honolulu, is the promoter. The Chief Engineer is W. A. Hall, and the Resident Engineer A. J. Storm. (Construction Supplement, Oct. 11, 1901.)

LAWTON & WICHITA MOUNTAIN.—Articles of incorporation were filed by this company at Guthrie, Okla. T., on Jan. 2, for a line 40 miles long between Lawton and Mount Scott and Sulphur Springs. The capital stock is $350,000 and the estimated cost of the road $200,000. The incorporators are J. B. Chapman, W. H. Anderson and others of Lawton, Okla. T.

LOUISVILLE & ATLANTIC.—An officer writes that track laying will begin March 1 on an extension 27 miles long between Miller's Creek, Ky., and Beattyville. The line will follow the Kentucky River for its entire distance and will open up timber and coal tracts. It is under contract to the Mason & Hoge Co., of Frankfort, Ky. (Construction Supplement, Oct. 11, 1901.)

MANITOULIN & NORTH SHORE.—Preliminary surveys for this line have been completed and Robert McDowall,

Town Engineer of Owen Sound, Ont., who is attached to the staff, states that no engineering difficulties were encountered along the route.

MEDICINE HAT & VICTORIA.—Application is being made to the Dominion Parliament by F. H. Phippen, of Winnipeg, Man., for incorporation of a railroad to run from Medicine Hat, Alberta, N. W. T., on the main line of the Canadian Pacific, north and northwest to a point on the North Saskatchewan River at or near Victoria in northern Alberta.

MILLEN & SOUTHWESTERN.—At a recent meeting of the stockholders of this company it was resolved to make extensions from the present terminus at Stillmore, Ga., 80 miles south to Waycross; also in an easterly direction through Burke and Screven counties to some point at or near Sylvania, 35 miles, and northeast from Sylvania to some point on the Savannah River. The company at present operates a line 32 miles long between Millen and Stillmore, Ga.

MISSOURI PACIFIC.—The cut-off from Jefferson City, Mo., 40 miles northwest to Boonville, is reported completed as far as track laying is concerned. It will be several months before heavy trains can be run over it, however, on account of work which still remains to be done in ballasting.

MOBILE & WEST ALABAMA.—Contract to survey this projected line between Tuscaloosa and Florence, Ala., a distance of 110 miles, has been let to Woolsey Finell, of Tuscaloosa. It is said that work was to begin Jan. 15 and that the surveys would be completed in June. The road will pass through the center of the Tuscaloosa County coal fields.

NATCHEZ, URANIA & RUSTON.—It is reported that an extension 35 miles long will be built during the present year between Hinton and Tremont, La. Henry E. Hardtner, Urania, La., President.

OREGON SHORT LINE.—Surveys are reported on an extension of the new branch between Blackfoot and Mackay, Idaho. If a feasible route can be found, it is said that the road will be built through as far as Lewiston, on the western boundary of the State, where a connection will be made with a proposed branch of the Oregon R. R. & Navigation Co., or it may perhaps extend to a connection with that part of the Harriman System, presumably at Grange City Junction, Ore.

PARAGOULD SOUTHEASTERN.—An officer writes that surveys have been completed and the work about two-thirds finished on an extension from Hornersville, Mo., to Chickasawba, Ark., 15 miles. The work is being done by the Dalhoff Construction Co., of Little Rock, who now have about 60 teams and 150 men at work, and it is expected that the line will be in operation by March 15. The maximum curves are 2 deg. and maximum grades half of 1 per cent. There are no iron or steel bridges on the line and the required rails and rolling stock have been secured. A new town named Paepcke will be located nine miles from Hornersville. New securities will probably be issued when the road is finished, but the financial arrangements are completed. (Dec. 27, 1901, p. 900.)

PEE-DEE RIVER.—The Secretary of State of South Carolina chartered, on Jan. 4, a railroad with the above title which proposes to build a line 30 miles long from Mars Bluff to Allison's Ferry and Rankin's Mill, where connection is made with the Atlantic Coast Line. The capital stock is $30,000, with privilege of increasing to $100,000. Three miles of the line have already been completed. The incorporators are N. S. Gibson, of Winona, and W. L. Rankin and W. K. Haigh, of Mars Bluff, S. C.

PENNSYLVANIA.—An officer sends a statement of track laid during 1901, which shows that work has been done on 22 projects, aggregating 110 miles. The largest amount laid on any one section was between Lock Haven and Keating, Pa., on the Pittsburgh & Eastern, a distance of 39½ miles. The next largest piece of work was 12½ miles on the New York Bay R. R., between Mount Union and Mill Creek. Ten miles was laid on the Shade Creek Extension, and 9½ miles on the Shellpot Branch of the Philadelphia, Wilmington & Baltimore. Nine miles was laid on the New York Bay R. R. in the vicinity of Waverly, and five miles between East Brunswick and Stelton. The remainder of the work consists entirely of short sections less than four miles long, and, in a large number of cases, less than one mile.

PHILLIPS & RANGELEY.—An officer writes that a line is projected between Madrid Station, Me., and Holman's Mill, a distance of six miles. Surveys have not as yet been made and no definite plans for building have been announced.

QUEBEC SOUTHERN.—Application is being made for authority to extend this company's line from the Parish of St. Robert, Que., through the counties of Richelieu, Yamaska, Nicolet, Lotbiniere and Levis to the town of Levis; also to ratify the company's title to certain properties forming part of its main line known as the United Counties Ry., and the East Richelieu Valley Railway.

ST. LAWRENCE & NORTHERN.—Application has been made to the Dominion Parliament from the City of Three Rivers, on the St. Lawrence River, in Quebec, in a northerly direction to La Tuque, Champlain County, on the west shore of the St. Maurice River, with a branch from a point near the mouth of the river Matteawan, Champlain County, west along the river to a point in Berthier County.

ST. LOUIS, MEMPHIS & SOUTHEASTERN.—This company was organized under the laws of Missouri, Jan. 8, with an authorized capital of $12,500,000, to build a railroad from a junction with the St. Louis & San Francisco at Crystal City, in Jefferson County, 30 miles distant. The company was formed for the purpose of taking over the Cape Girardeau & Northern, the Southern Missouri & Arkansas, Hoxie, Pocahontas & Northern, St. Louis & Memphis and a portion of the Chester, Perryville & Ste. Genevieve. It is specified that these lines are to be completed and rebuilt by Dec. 31, 1902, involving 154 miles of new line and an existing mileage of 266, and the contracts have been let to Johnston Bros. About 30,000 tons of rails have also been ordered from the Cambria and Carnegie companies. The directors are Frederick H. Prince and Frederick Ayer, of Boston; Newman Erb and E. Summerfield, of New York; George H. Norman, of Providence; E. F. Blomeyer, Cape Girardeau, Mo., and John Scullin, Hugh McKittrick and Chas. Gilbert, of St. Louis. It is said that the terms of agreement for the absorption of the above named roads have been concluded, but are not yet announced. The project, when completed, will give a total of 420 miles and a main line from St. Louis to Luxora, Ark., which will form, in connection with the St. Louis & San Francisco, the shortest route between Birmingham, Memphis and St. Louis.

ST. MARY'S RIVER.—Application is being made by Walter Barwick, of Toronto, for incorporation of an extension of this company's road north and west by way of the North Kootenay Pass to a point on the Kootenay River in British Columbia between Wardner and the International boundary, with power to build branches additional. The proposed extension would reach the Crows Nest coal fields.

SANDY VALLEY.—This company was chartered at Harrisburg, Pa., to build a line 16 miles long to a junction with the new West Branch Valley R. R., at the mouth of the Susquehanna River and along its course to Big Knobs. The capital stock is $1,800,000. An option on 26,000 acres of coal fields on the headwaters of Sandy River has been secured.

SHREVEPORT & RED RIVER VALLEY.—Contract has been let to Epple & Hayes for grading 14 miles additional of this projected line north from Campti, La. Work will begin at once. P. McIlvried, Shreveport, La., General Manager.

SOUTHERN PACIFIC.—It is said that this company will build, during the present year, the cut-off from Ogden around the southern end of Salt Lake to Salt Lake City. This has been for some time under consideration along with other plans for shortening the line, and if built, will take off nearly 100 miles of the distance to the Pacific Coast. (Nov. 15, p. 798.)

Contract has been let to Curry Bros. & Co., of Ogden, Utah, for grading 15 miles immediately west of Wadsworth, Nev., on the new line known as the Wadsworth cut-off. The estimated cost of the grading is $85,000. The work is chiefly earth excavation except for a 1,100-ft. tunnel near Brown. The new line leaves the town of Wadsworth entirely off the railroad.

SOUTHWESTERN.—Charter has been granted in Tennessee to S. J. Kirkpatrick, J. H. Bowman, T. L. Earnest, W. H. Brown and S. C. Williams for a railroad to run from a point on the North Carolina-Tennessee line in Unicoi County, to the Virginia-Tennessee line in Sullivan County and beyond into adjoining States. The distance across that part of Tennessee in an air line between the points named is about 35 miles. The capital stock is $100,000.

TOLEDO ELECTRIC.—This company was recently organized in Iowa, with a capital stock of $200,000, and with headquarters at Toledo. It is proposed to build electric lines running north and south out of Toledo, Iowa, and to purchase and lease other electric lines within the State. The officers are: President, W. C. Walters; Vice-President, J. R. Caldwell; Secretary, C. E. Walters, and Treasurer, H. A. Shanklin, all of Toledo.

TRINITY VALLEY & SOUTHERN.—An officer writes that eight miles of this road in Texas are at present building between Oakhurst and Point Blank. A line known as Trinity Valley was completed between Dodge and Oakhurst in 1900, and this is a continuation of the same. Work is being done by the Columbia Lumber Co., Oakhurst, Texas. (Dec. 27, 1901, p. 900.)

WEST POINT & HOUSTON.—Charter has been granted by the Governor of Mississippi for a company proposing to build a line 27 miles long from West Point, in Clay County, to Houston in Chickasaw County. It is said that the line will be completed within a year.

WISCONSIN & ARKANSAS LUMBER.—This company is building a railroad 15 miles long in Arkansas to a point near Princeton.

GENERAL RAILROAD NEWS.

ATCHISON, TOPEKA & SANTA FE.—An issue of $30,000,000 4 per cent. serial debenture bonds is to be made under an indenture to the Guaranty Trust Co., of New York, as trustee. Statement is made by President Ripley that the debentures will consist of 12 series of $2,500,000 each, one of which series will mature Feb. 1, 1903, and one on each succeeding first day of February to and including 1914, each series to be subject to redemption on any interest day after publication of notice, at 105 and accrued interest. The company covenants not to execute any new mortgage upon any of the lines of railroad now owned by it except by way of further security for bonds issued under existing mortgages, unless by the terms of such new mortgage it shall be provided that all of the outstanding debentures shall be included in the debt thus secured. The purpose of these bonds is to provide for the purchase of equipment, the building and acquisition of branch lines and terminal facilities, reduction of grades and other permanent betterments, and to reimburse the treasury for money spent for the foregoing purposes since July 1, 1901.

BLUE RIDGE.—This company has leased the 10-mile branch of the Southern between Belton and Anderson, S. C., the lease taking effect at midnight on Dec. 31 last. It is said that an improved passenger service will be inaugurated.

BOSTON & ALBANY.—The Massachusetts Railroad Commissioners have authorized the issue of $3,858,000 of 50-year 3½ per cent. bonds for the purpose of taking up bonds which mature April 1, 1902. This is in accordance with the agreement entered into when the road was leased to the New York Central.

BUENOS AYRES & GREAT SOUTHERN.—The annual report of this company for the year ending June 30, 1901, shows total gross receipts on all its lines, including those worked under agreement, to have been £2,367,388, an increase of £55,591 over the figure for the previous year. The working expenditure during the year was £1,159,122, an increase of £35,303 over the preceding year, leaving a net profit of £1,208,266, as against £1,187,978 for the preceding year. The percentage of expenditure to receipts is the low figure of 48.61. The statistics also show that 4,045,737 train-miles were run during the year, an increase of 161,345 over the year previous, and that the receipts per train mile were 11s. 8.44d., a decrease of 2.4d. per mile. The average number of miles operated was 2,298 during 1901, and 2,296 during 1900. By far the greatest item of freight was wheat, which reached 565,636 tons; large amounts of stone were also handled. The number of first-class passengers carried during the year was 2,947,367; the number of second-class 2,919,130, and others including Company's and Government service brought the total to 6,037,671, as against 5,669,702 for the previous year. The receipts from passenger traffic, however, decreased £8,213, from £605,766 to £597,553. The General Manager calls attention to the fact that the percentage of working expenditure to receipts is practically the same as last year, in spite of the fact that £41,000 has been added to the company's expenses through increased cost of coal. He adds that through the exercise of rigid economy the coal consumption has been lower per engine mile than in any of the four preceding years. The prospects for the coming year are favorable since the wheat crop promises to be exceptionally heavy, and a marked improvement is anticipated in both first class and second class passenger traffic.

BUFFALO, ROCHESTER & PITTSBURGH.—Permission has been granted this company by the New York Railroad Commissioners to increase its capital stock from $12,000,000 to $15,000,000, for the purpose of retiring debenture bonds.

CANADIAN PACIFIC.—Application is being made for an amendment to this company's charter to enable it to buy or lease property outside the Dominion of Canada. It is also desired to issue additional consolidated debenture stock for the acquisition of steam vessels. Steps are to be taken for securing to the company the rights of an irrigation and land company.

CENTRAL OF NEW JERSEY.—The directors have declared a dividend of 2 per cent. for the last quarter of 1901, instead of 1¼ per cent. which has been declared quarterly since February, 1900.

CHAGRIN FALLS & NORTHERN.—This road, which runs between Chagrin Falls Junction and Chagrin Falls, Ohio, eight miles, was sold at foreclosure to Clarence E. Sanders for $50,000 in the interest, it is thought, of the Pennsylvania. For the last few years it has been operated by the Wheeling & Lake Erie under contract with Max J. Rudolph, Receiver. It was formerly a branch of the Cleveland, Canton & Southern.

DETROIT, GRAND HAVEN & MILWAUKEE.—The special charter having been repealed by the last Legislature in Michigan, effective Dec. 31, 1901, the company has been notified by the Railroad Commission that under the general railroad law of the State, it will be required to carry passengers at the rate of 2½ cents per mile, since the earnings of its passenger trains are in excess of $2,000 per mile of road operated. This is one of the oldest railroads in the State, running between Grand Haven & Detroit, 189 miles, and operated under special traffic agreement as a part of the Grand Trunk System, and it has been operated under its special charter ever since it was built.

INTERCOLONIAL.—The report for the fiscal year ending June 30 last, shows the gross earnings of the road to have been $4,972,235, and the working expenses $5,460,422, leaving a nominal deficit of $488,187. During the year the earnings increased $202,696 on passenger traffic, and $208,215 on freight traffic, but the working expenses increased approximately $1,000,000, of which $585,917 was spent on motive power, and $214,034 on cars. There was also an expenditure of $188,285 on general maintenance of way.

KANSAS CITY SOUTHERN.—This company, on Dec. 31, bought at foreclosure sale the Consolidated Terminal R. R., the Kansas City Suburban Belt and the Kansas City & Independence Air Line; also the Union Terminal Co., of Kansas City, at a total cost of $3,550,000. On Jan. 7 the property of the Port Arthur Channel & Dock Co. was bought at Beaumont, Texas, for $500,000. The Kansas City Southern has been owner of the majority of the securities of all the companies mentioned.

MANITOULIN & NORTH SHORE.—A meeting of the stockholders will be held Feb. 3, in Sault Ste. Marie to authorize an issue of $8,820,000 bonds secured by mortgage upon the property and franchises of the company, and also $7,000,000 of bonds secured by mortgage on land grants.

NEW YORK, NEW HAVEN & HARTFORD.—Ownership of several recently built trolley lines in the eastern part of Connecticut has been announced by this company. The main line, known as the Thompson Tramway Co., runs between Killingly, Conn., and Worcester, Mass. Application has been made to the court to change the name of the trolley road to Worcester & Eastern Connecticut. It parallels the Norwich & Worcester branch of the N. Y., N. H. & H., and was built to prevent its ground being taken up by opposing interests.

NORTHERN SECURITIES.—The United States Supreme Court, in the case of the State of Minnesota vs. the Northern Securities Co., directs that notice of the application be given the defendant and that the application be heard on Monday, Jan. 27.

NORTH PACIFIC COAST.—This property is under examination by J. C. and E. Coleman and Antoine Borel, with a view to reorganization. The North Pacific Coast is a narrow gage line extending from San Francisco to Cazadero, Cal., 86 miles, including a ferry six miles long, and the three men named are large stockholders. It is said that they will take an option on the property in conjunction with parties from New York and Boston. The property has run down under its present management, but the ferry and suburban traffic are considered valuable. The line was originally built in 1872.

SEABOARD AIR LINE.—At a meeting of the shareholders, Feb. 5, action will be taken on the proposition to buy the properties of the Georgia & Alabama and the Logansville & Lawrenceville railroads. The Logansville & Lawrenceville, extending between the points named in Georgia, 10 miles, is at present operated by the Georgia, Carolina & Northern, which is a branch of the Seaboard Air Line. The Georgia & Alabama operates 457 miles of road and has for some time been controlled by the Seaboard Air Line by the ownership of a majority of stock.

SOUTHERN PACIFIC.—The lease of the Louisiana & Texas and Louisiana Western lines to this company expired on Jan. 1, 1902, and notice has been given that the properties will henceforth be operated independently, although in harmony with the previous management. This includes the Morgan line of steamers between New York and New Orleans. The statement is made that the resulting change will not involve any change in the facilities or conveniences of service heretofore offered the public. The lease was made in 1884.

SOUTHWESTERN SECURITIES.—This company was incorporated at Trenton, Jan. 6, with a capital of $100,000. No object has been stated except the formal announcement in the incorporation that it may underwrite, subscribe for, purchase and acquire the bonds, debentures or other securities, etc., of other corporations. It is rumored that the eventual purpose of this company will be to take over securities of Gould roads in the Southwest.